LOWER COLUMBIA - LEWIS BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bull trout/Dolly Varden in the Lewis River have been identified as a distinct stock based on their geographic distribution. Currently only small populations of bull trout/Dolly Varden have been found in the Merwin, Yale and Swift reservoirs above Merwin Dam. We believe that prior to dam construction the Lewis River also contained anadromous and fluvial bull trout/Dolly Varden. The bull trout/Dolly Varden populations studied to date have been found to be adfluvial. Some genetic sampling has been done, but we do not know if this stock is genetically distinct.

Currently there is no upstream passage of fish among the three dams. Some fish move downstream when water is spilled over the dams.

Bull trout/Dolly Varden in the Merwin reservoir are thought to be present as a result of water spilled over Yale Dam and are not believed to spawn in Merwin Reservoir. Adult bull trout/Dolly Varden are seen concentrated at the base of Yale Dam in the fall each year. We believe these fish reared in Yale Reservoir and attempt to return to it to spawn. In 1995 surveys were done to document the number of adults staging at the base of the dam.

Cougar Creek is the only known spawning location for bull trout/Dolly Varden in Yale Reservoir. Spawning usually occurs from September through October. (PacifiCorp 1996).

Radio tagging of adult bull trout/Dolly Varden staging at the top end of Swift Reservoir was done in the spring of 1990, 1991 and 1994 has shown that spawning occurs only in Rush Creek and Pink Creek. A total of 46 adult bull trout/Dolly Varden were monitored for movement, habitat preferences, and spawn timing. Spawning occurred from late August through mid-September. This research was done cooperatively by the U. S. Forest Service, PacifiCorp, and WDFW.

Lewis River bull trout/Dolly Varden are native and are maintained by wild production.

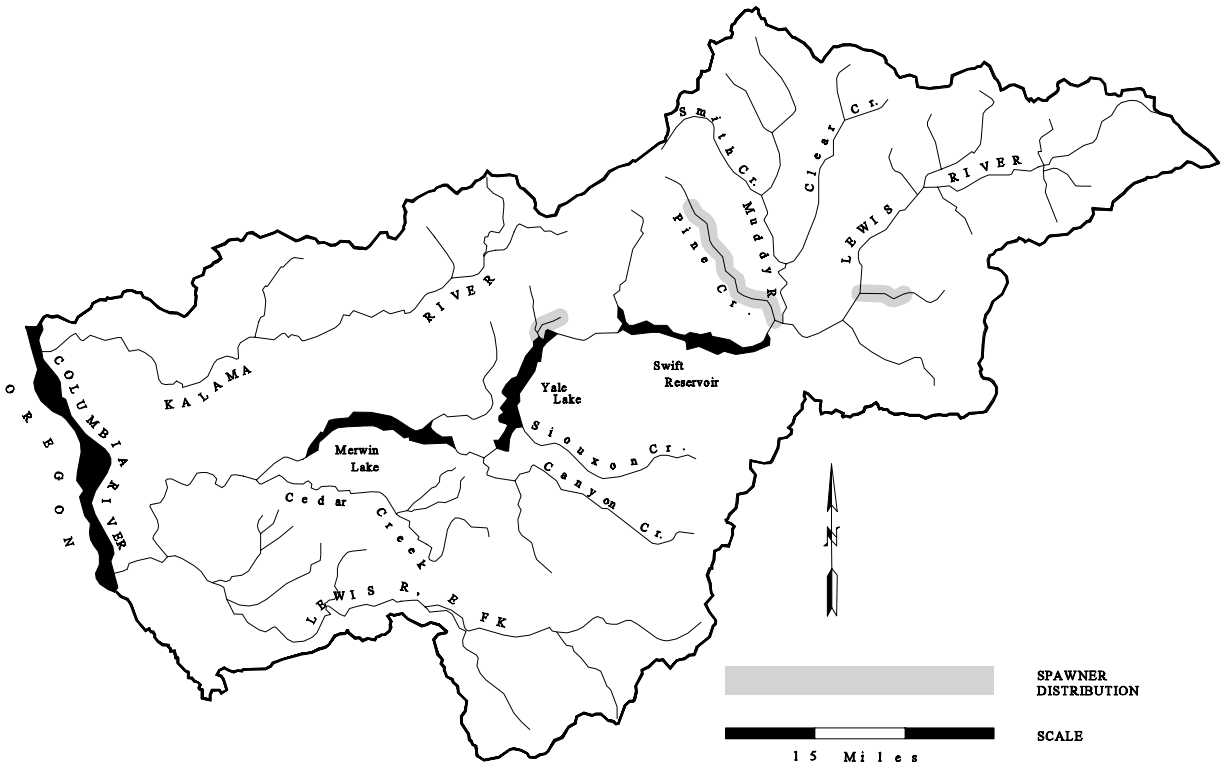
STOCK STATUS

Stock status is Depressed due to chronically low abundance. Spawner surveys in Cougar Creek since 1988 show an average peak count of 22.5 (range seven to 37 fish). The lowest and highest counts during the survey period occurred in 1995 and 1994, respectively. Data quality is good.

STOCK DEFINITION PROFILE for Lewis Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

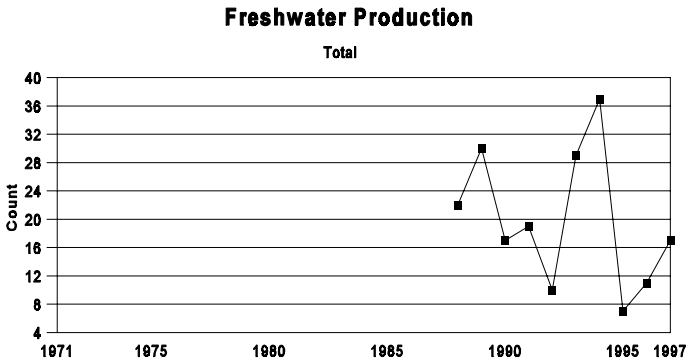
STOCK STATUS PROFILE for Lewis Bull Trout/Dolly Varden

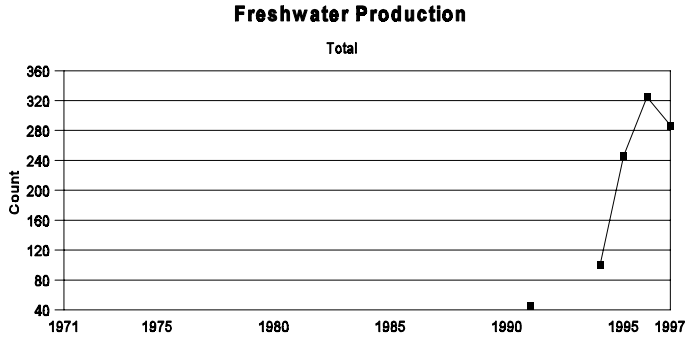
STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	FW PROD Total	FW PROD Total		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88	22			
89	30			
90	17			
91	19	46		
92	10			
93	29			
94	37	101		
95	7	246		
96	11	325		
97	17	287		

Column 1: Cougar Cr adult counts
Column 2: Swift Reservoir adult counts





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Depressed

Screening Criteria
Chronically low

In addition to the radio-tagging study, work has been done to estimate the number of bull trout/Dolly Varden leaving Swift Reservoir during the spawning run in the fall. These number are felt to be rough by the biologists who collected them, but adequate to represent trends in abundance. In 1991, a spawning population of 46 adults was estimated. In 1994 through 1997 estimates with 95% confidence intervals (C.I.) of numbers of spawning ascending in mainstem NF Lewis River above Swift Reservoir and entering Rush and Pine Creeks were:

Year	Estimated Spawners	95% C.I.
1994	101	85-118
1995	246	193-326
1996	325	173-782
1997	287	235-361

The biologists from the Forest Service, PacifiCorp and WDFW believe the bull trout/Dolly Varden populations in the Lewis River are slowly rebuilding since 1990 when monitoring began. Currently, there are no procedures for developing escapement goals, so we do not know if the system is fully seeded.

FACTORS AFFECTING PRODUCTION

Habitat--The North Fork Lewis River contains three mainstem power dams which restrict movement of bull trout/Dolly Varden in the watershed. The eruption of Mt. St. Helens in 1980 devastated streams such as Pine Creek. Pine Creek is slowly recovering with clean gravels and revegetated streambanks. Activities such as logging, road building, and development are also occurring above Merwin Dam. Rush Creek is a high-gradient stream.

Harvest Management--Fishing for bull trout/Dolly Varden has been closed in the Lewis River since 1992. Some hooking mortality from catch and release of bull trout/Dolly Varden may occur in fisheries targeting other fisheries. A resident coho sport fishery takes place in Merwin Reservoir, with low numbers of kokanee also being caught. There is a popular kokanee fishery in Yale Reservoir. Incidental catch of bull trout/Dolly Varden in both reservoirs is thought to be low. A very popular sport fishery for hatchery rainbow trout takes place in Swift Reservoir. The river above Swift is a no-bait area up to the lower falls, (the upper limit of adfluvial bull trout). Incidental catch of bull trout/Dolly Varden is thought to be much higher above Swift Dam than below. The WDFW Enforcement Program has been very active in protecting bull trout/Dolly Varden in the reservoirs and tributaries.

Hatchery--Three hatcheries are located on the North Fork Lewis River, two below Merwin Dam and one on the north shore of Merwin Reservoir. Hatchery coho salmon fingerlings are planted annually in Merwin Reservoir as part of a mitigation program. Hatchery fingerling rainbow trout are planted annually into Swift Reservoir. The Lewis River above Swift Reservoir is not planted with hatchery fish. Kokanee were introduced into the upper reservoirs in the 1950s and now spawn in tributaries of Merwin and Yale reservoirs. Interactions between hatchery-origin salmonids and bull trout/Dolly Varden have not been examined. Brook trout were stocked in upper Lewis watershed. We do not know what effect brook trout may be having on bull trout/Dolly Varden.

LOWER COLUMBIA -- WHITE SALMON BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bull trout/Dolly Varden in the White Salmon River have been identified as a distinct stock based on their geographic distribution. Reported sightings of bull trout/Dolly Varden in the White Salmon River are rare. Two sightings have been reported above Condit Dam, both by WDFW biologists. One fish (273 mm long) was captured in a gill net set in the spring of 1986 in Northwestern Reservoir. The other (about 305 mm long) was checked in the opening day creel census in April 1989. Two sightings have been reported by sport anglers below Condit Dam in the last several years.

Bull trout/Dolly Varden seen below Condit Dam are not believed to reproduce in the White Salmon River. Electroshocking in the lower river has not turned up any juvenile bull trout/Dolly Varden. WDFW fish biologists believe the adult bull trout/Dolly Varden caught in the White Salmon River are “dip-ins” from the Hood River in Oregon. The Hood River contains a small population of bull trout/Dolly Varden which are monitored with an adult trap at the lower end of the river by the Oregon Department of Fish and Wildlife. Other systems in which bull trout/Dolly Varden have been seen are the Wind and Little White Salmon rivers (Drano Lake). Neither of these systems is believed to support reproducing populations of bull trout.

Spawn timing and locations are unknown.

White Salmon bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

Stock status is Unknown. There is insufficient information to make an assessment.

Presence-absence surveys have been conducted by U. S. Forest Service staff in the upper watershed above Trout Lake for the last several years without locating any bull trout/Dolly Varden. Gill net sets and creel censuses have been carried out in Northwestern Reservoir to monitor the trout fishery for many years without reporting bull trout/Dolly Varden catch. Some creel and fish survey work has been done on the mainstem White Salmon River and tributaries above Northwestern Reservoir without locating any bull trout/Dolly Varden.

FACTORS AFFECTING PRODUCTION

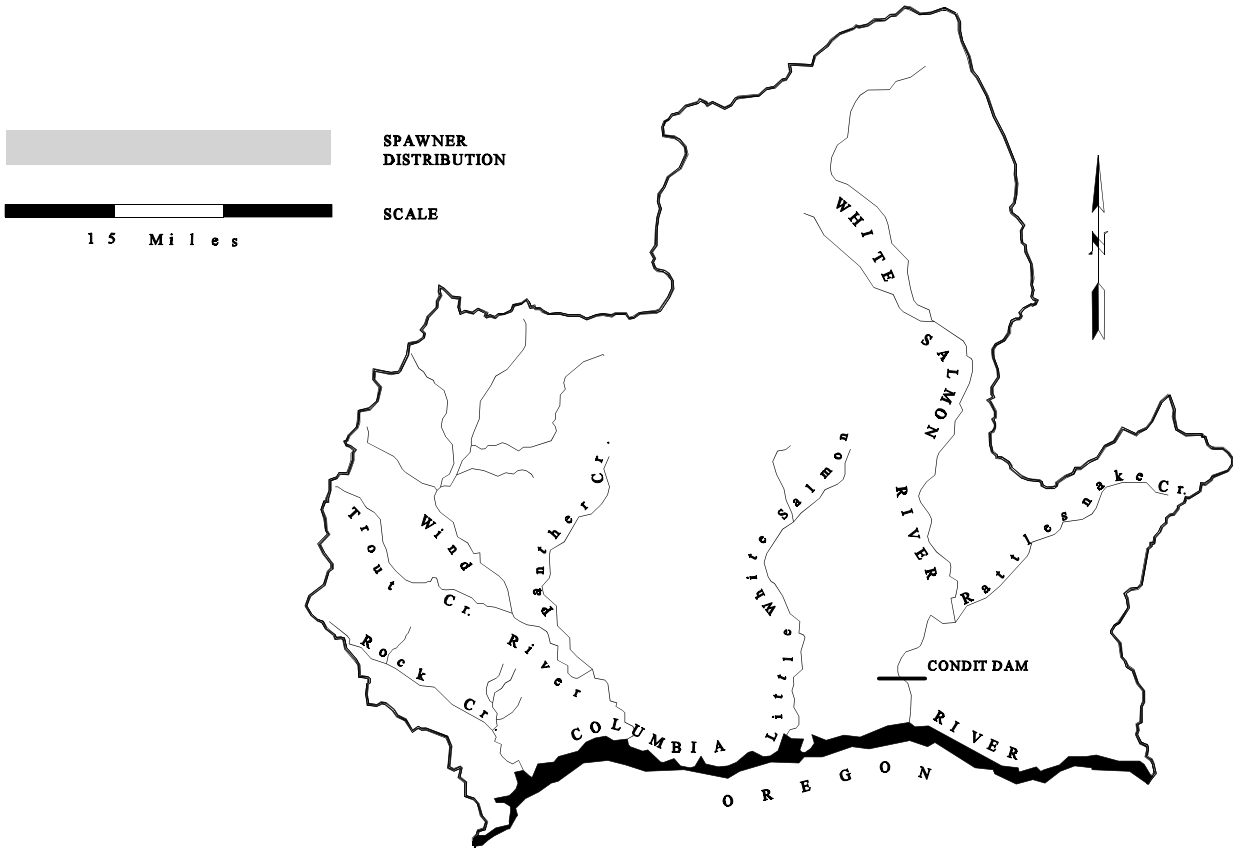
Habitat--The White Salmon River contains potential bull trout/Dolly Varden spawning habitat in the upper reaches above Trout Lake. Spawning water temperature is a

STOCK DEFINITION PROFILE for White Salmon Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for White Salmon Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

critical limiting factor. Many upper river tributaries such as Trout Lake Creek contain suitable spawning gravels, but the water is too warm for bull trout/Dolly Varden spawning. Consequently only a small fluvial population could be supported. Bull trout/Dolly Varden which migrate below the falls at RM 16 would probably not be able to ascend the falls and would not find suitable spawning habitat. Condit Dam has been a barrier to fish trying to ascend the White Salmon River from the Columbia River throughout most of this century. Both this dam and the Columbia River dams have changed bull trout/Dolly Varden movements and habitat. They block both adult and juvenile passage, and they kill fish going through the spillways and turbines. They slow and warm the water behind them which changes plant and fish communities in the rivers and makes much of the river system unsuitable for bull trout/Dolly Varden.

Harvest Management--Fishing for bull trout/Dolly Varden has been closed in the White Salmon river since 1992.

Hatchery--There are no hatcheries in the White Salmon drainage. Hatchery-origin spring chinook and coho are released into the White Salmon River below Condit Dam, so interactions with wild bull trout/Dolly Varden stock are unlikely. Hatchery rainbow trout fingerlings are released into Northwestern Reservoir annually and may serve as food for bull trout/Dolly Varden. In general, interactions between hatchery salmonids and bull trout/Dolly Varden have not been examined.

KLICKITAT -- KLICKITAT BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Klickitat bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Very little is known about the wild bull trout/Dolly Varden stock in the Klickitat River other than they are known to occur there. Bull trout/Dolly Varden have been observed in the mainstem above the West Fork and in Trappers Creek (a tributary of the West Fork) during snorkel and electrofishing surveys in 1990 and 1995 (Bill Sharp, Yakama Indian Nation, personal communication). We do not know if the bull trout/Dolly Varden that inhabit the Klickitat River drainage are strictly fluvial with resident forms occurring in the headwaters or if the anadromous form is present as well. There are no barriers that prevent migration of bull trout/Dolly Varden from the Columbia River.

Genetic characteristics of bull trout/Dolly Varden in the Klickitat drainage have not been examined. At the present time, there is insufficient information on bull trout/Dolly Varden distribution, abundance, life history forms and migration barriers within the Klickitat drainage to warrant subdividing the population into more than one stock.

Spawn timing and location, age at maturity, sex ratio and fecundity, timing of fry emergence and survival rates are unknown.

Klickitat bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

The status of the stock is Unknown. There are insufficient data to make an assessment. However, it appears that there are very few bull trout/Dolly Varden in the lower to mid-Klickitat River drainage. As expected, bull trout/Dolly Varden appear to be more abundant in the upper drainage where habitat conditions are more favorable for native char than in the lower drainage. Four bull trout/Dolly Varden up to 10 inches in length were observed during snorkel surveys in the upper mainstem (RM 64, above the West Fork), and 23 bull trout/Dolly Varden (three to seven inches in length) were observed during electrofishing surveys in Trappers Creek. Additional surveys need to be conducted in this upper drainage to determine the distribution and abundance of bull trout/Dolly Varden.

FACTORS AFFECTING PRODUCTION

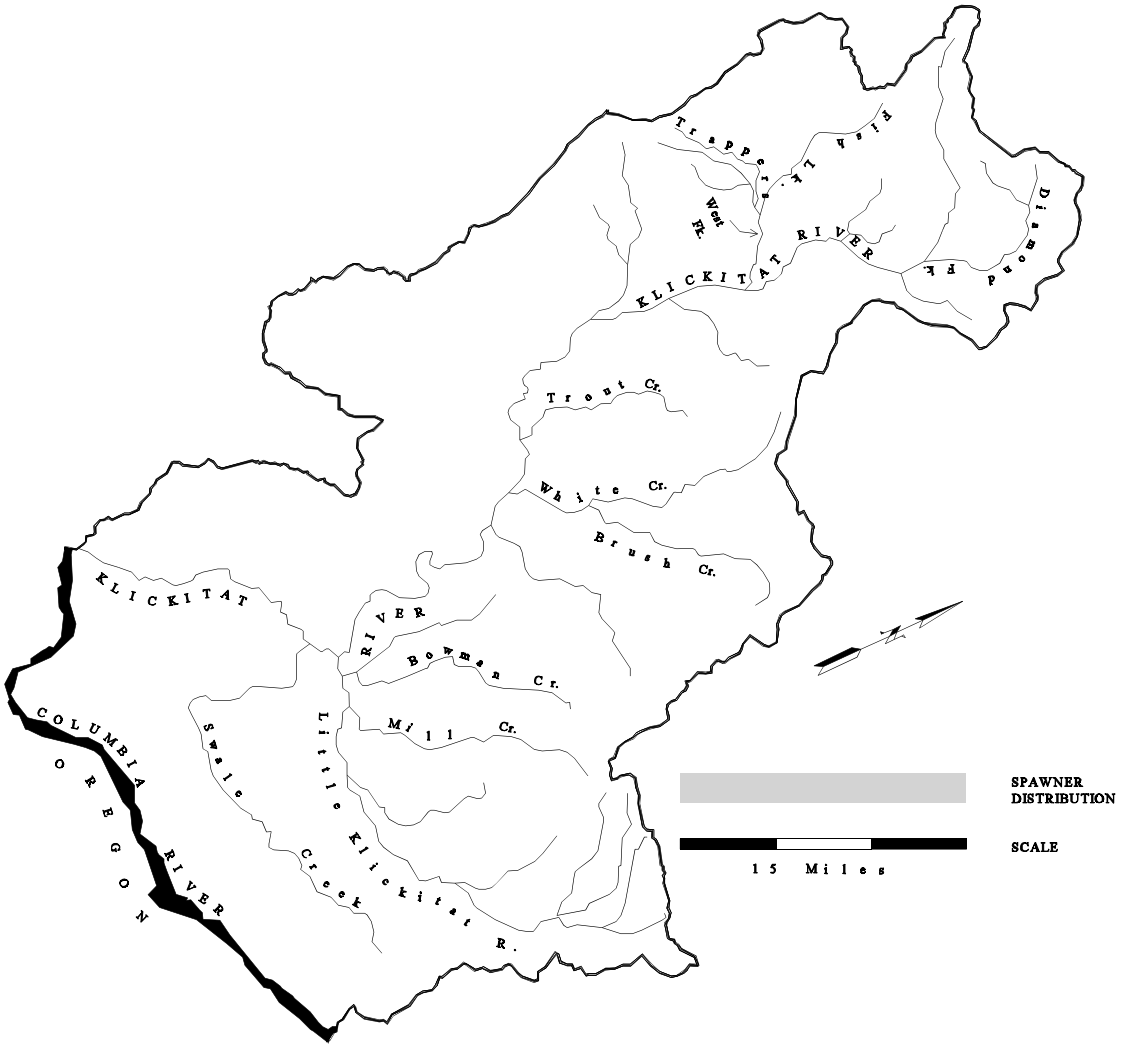
Habitat--The principal factors limiting bull trout/Dolly Varden production within the Klickitat drainage are as follows. Warm water temperatures due to natural low flows

STOCK DEFINITION PROFILE for Klickitat Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Klickitat Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

are a concern for adult bull trout/Dolly Varden that may spawn in the mainstem or in the lower reaches of tributaries as well as for juveniles that rear in the area. Irrigation water withdrawals from the Little Klickitat River and other lower river tributaries exacerbate natural low river flows and warm water temperatures. Riprap along the banks of the lower river eliminates riparian vegetation and also contributes to higher water temperatures. Turbid water conditions and sedimentation during peak discharge periods from natural sources as well as grazing, logging and roads impair fish health and impede fish growth and development. Human development within the floodplain and in riparian areas (particularly in the Little Klickitat drainage) reduces bank protection and overhead cover, elevates water temperatures and increases sediment loads in the river. Most areas of the upper drainage where development has not occurred appear to be in excellent condition.

Harvest Management--General trout fishing seasons have remained the same in the Klickitat River drainage for about ten years. Historically in the Klickitat River bull trout/Dolly Varden were included as part of the two-trout catch limit, and the minimum size limit was 12 inches. The fishing season was from June 1 to November 30. In the Little Klickitat River regulations were more liberal, with an eight-trout catch limit (five trout in 1994) and no minimum length (June 1 to Oct. 31 season). Fishing was prohibited in the upper Klickitat River and its tributaries within the boundaries of the Yakama Indian Reservation. Beginning in 1992, fishing for bull trout/Dolly Varden was prohibited in the Klickitat drainage.

With the exception of one 432 mm bull trout/Dolly Varden caught in 1991 downstream from the Little Klickitat River (David Lind, Yakama Indian Nation, personal communication) there are no records or references to the catch of bull trout/Dolly Varden. WDFW catch records dating back to 1983 do not show any bull trout/Dolly Varden kept or released. Data prior to 1983 are not available.

Although angling impacts and harvest are not known, they may have been significant prior to the implementation of restrictive fishing regulations in the early 1980s.

Hatchery--Hatchery rainbow trout have been stocked in the Little Klickitat River and tributaries at least since the late 1960s (hatchery stocking records are not readily available before this date). Non-native brown trout were also stocked in the Little Klickitat River in 1984 and 1985. It is difficult to tell what impacts stocking may have had on bull trout/Dolly Varden without historical distribution and abundance of bull trout/Dolly Varden in the drainage. We do not know if bull trout/Dolly Varden even existed in the Little Klickitat River.

Currently, bull trout/Dolly Varden appear to be more abundant in the upper tributaries of the Klickitat drainage, thus current stocking practices probably have negligible impacts on them. Hatchery impacts on bull trout/Dolly Varden are usually manifested in the form of competition for food and space, predation of juvenile bull trout/Dolly Varden and

increased angler harvest rates of trout (including the increased incidental catch of bull trout/Dolly Varden). We do not know what the impacts of stocking hatchery salmon and steelhead in the mainstem Klickitat River on bull trout/Dolly Varden have been. Generally, in drainages colonized by anadromous salmon and steelhead, bull trout/Dolly Varden have successfully co-existed by occupying a different ecological niche. However, negative interactions (predation) can occur when hatchery fish (anadromous or otherwise) are stocked near bull trout/Dolly Varden spawning and rearing areas.

OVERVIEW -- WALLA WALLA
BULL TROUT/DOLLY VARDEN STOCKS

TOUCHET
MILL CREEK

STOCK DEFINITION AND ORIGIN

The Walla Walla River originates in the western portion of the Blue Mountains of Oregon east of Milton-Freewater and north of Tollgate. The lower half lies in Washington and drains into the Columbia River a few miles upstream of the Washington/Oregon border. Of the nine principal tributaries of the Walla Walla River in Washington, only two are known to contain bull trout. These are Mill Creek and the upper Touchet River basin.

The Blue Mountains of Washington are a relatively small but geologically old, low-elevation mountain range running from west to east in Walla Walla, Columbia, Garfield, and Asotin Counties. Ancient lava flows exuded from south to north, creating the basalt base of the Columbia Plateau. As the prehistoric Lake Missoula floods flowed west and southwest, alluvial materials were deposited over the Columbia Plateau up to the base of the Blue Mountains in southeast Washington. This probably accounts for much of the large amounts of gravel and soil present in the lower reaches of the Walla Walla, Touchet, and Tucannon rivers. Many of the higher-elevation tributaries containing bull trout are predominately basalt laden and do not exhibit the normally encountered diversity of gravels found in other drainages in the Cascades. Despite the low elevation of the Blue Mountains, the drainage gradients are steep and unstable from an erosion potential standpoint. The headwaters of tributaries with bull trout/Dolly Varden populations in Washington's Blue Mountains are all located in fairly close to one another, often separated by one mountain ridge. Southeast Washington represents some of the earliest records of pioneer settlement. Resulting agricultural conversion and heavy use of the area's water, soil, and timber resources rapidly degraded riparian and in-stream habitats. Most of the lower reaches of drainages in the southeast part of the state are characterized by over-appropriated water withdrawals, siltation, and seasonal high water temperatures and are marginal for optimum salmonid use.

Mill Creek headwaters begin in Washington on the Umatilla National Forest, enter Oregon near the City of Walla Walla water intake and then re-enter Washington some miles downstream. This upper portion has long been the municipal watershed for the city of Walla Walla and has therefore afforded protection for remnant bull trout populations. The population consists of resident and fluvial fish that are isolated from their historic distribution by the watershed and downstream irrigation diversions.

Adfluvial and even anadromous bull trout were likely present prior to the arrival of pioneers and probably moved freely throughout the Walla Walla and Touchet systems.

The Touchet River basin is comprised of the North Fork, and Wolf Forks, Robinson Fork of the Wolf Fork and the South Fork. Bull trout/Dolly Varden have been confirmed only in the North and Wolf forks of the Touchet River but may also be present in small numbers in the South and Robinson forks. Fluvial and resident life history forms are present, with the former probably moving throughout the upper sub-basins.

WALLA WALLA - TOUCHET BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Touchet bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. The stock includes fish in the North Fork Touchet, the Wolf Fork, Robinson Fork and the South Fork Touchet. The Wolf Fork is a tributary of the North Fork, and the Robinson Fork is a tributary of the Wolf Fork. Spawn-timing information and fish-size measurements from surveys conducted by the Forest Service in 1994 and 1995 suggest that both resident and fluvial life history forms are present. Spawn timing is from late August through early October.

The fluvial life history form is thought to move freely among these three streams. Movement between the Touchet and Walla Walla systems may have occurred prior to non-Indian settlement and development in the mid- to late 1800s. The resident life history form in each fork may be isolated.

Recent surveys indicate adults spawning in the Wolf Fork are smaller and spawn earlier than those in Mill Creek and the Tucannon River. Wolf Fork bull trout/Dolly Varden represent the stronghold of the Touchet River basin bull trout/Dolly Varden populations. Spawning occurs in the upper 3.4 miles. Bull trout/Dolly Varden spawning has not been confirmed in Robinson Fork.

Bull trout/Dolly Varden are likely present in the South Fork Touchet but are unconfirmed. If still present, remaining bull trout/Dolly Varden are probably isolated from others in the basin by poor habitat conditions in the lower reaches.

Touchet bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

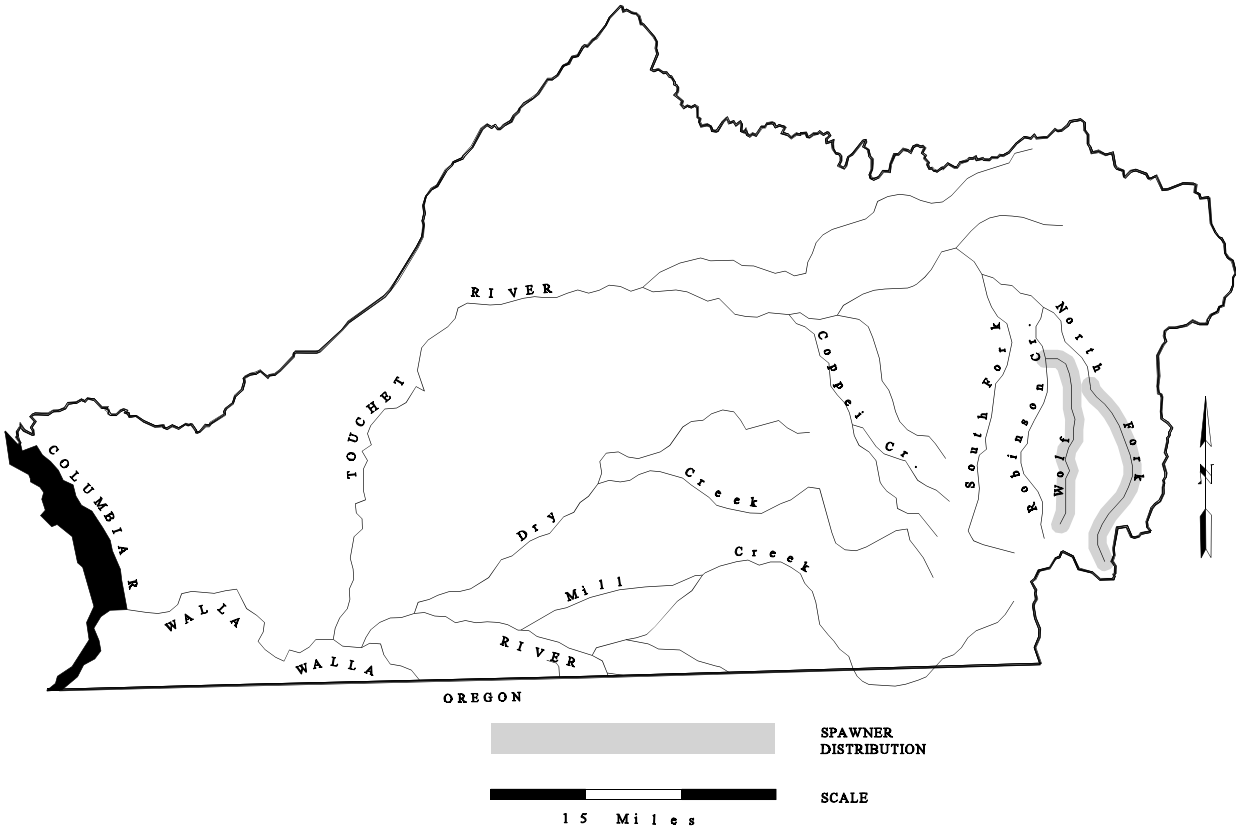
The status of Touchet bull trout/Dolly Varden is Unknown, but may be Depressed based on chronically low numbers of adults, juvenile densities, and declining numbers of redds. Information on the stock is limited. The quantitative data for this stock are from spawner surveys conducted by Forest Service personnel in 1994 and 1995 over three index/survey areas in the North Fork and from juvenile density surveys conducted in 1991 and redd counts made from 1990 by WDFW personnel in the Wolf Fork . Data quality is fair for the North Fork surveys and good for the Wolf Fork surveys. No information is available from the Robinson Fork.

Bull trout/Dolly Varden in the South Fork Walla Walla (Oregon) may interact with Touchet fish, and the status of each population may affect the other. Redd counts in

STOCK DEFINITION PROFILE for Touchet Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawning													Unknown

BIOLOGICAL CHARACTERISTICS

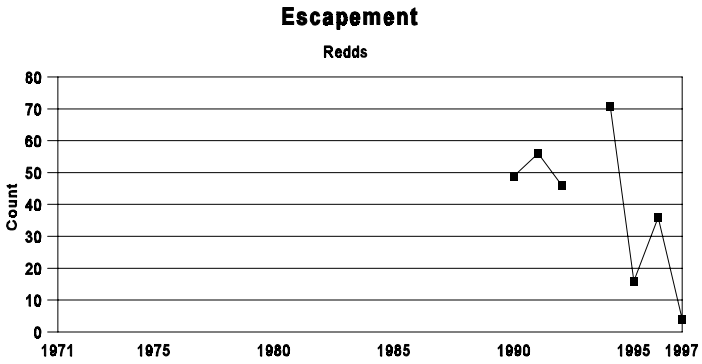
DISTINCT? - Unknown

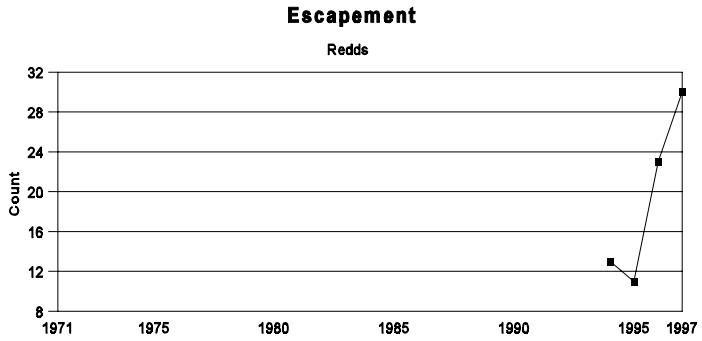
STOCK STATUS PROFILE for Touchet Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Redds	ESCAPE Redds	ESCAPE Redds	FW PROD No/100m^2
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	49			
91	56			9.2
92	46			
93				
94	71	13	15	
95	16	11	11	
96	36	23	28	
97	4	30	37	





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

the SF Walla Walla from 1993 through 1996 have been stable (1993--103; 1994--143; 1995--114; 1996--177), and the population has been characterized as being at low risk of extinction (Buchanan, Hanson and Hooton 1997). No redds were seen in the North Fork Wall from 1994 through 1996, and the status of this population has been described as being at high risk of extinction (Buchanan, Hanson and Hooton 1997).

FACTORS AFFECTING PRODUCTION

Habitat--North Fork in-stream habitat has been degraded by logging activities and related road construction, agricultural activities, livestock grazing and development. The streambed in the upper North Fork is composed primarily of angular basalt, suffering from size compaction and sedimentation from logging the highly erodible steep slopes characteristic of most drainages in the Blue Mountains.

A small ski area within the Umatilla National Forest has also contributed significant amounts of sediment to the North Fork in the past, and there are plans for future expansion. Also, a large resort complex has been proposed for the basin along the North Fork above the Wolf Fork. The resort would include a golf course and both lodge and condominium developments. This level of development could further degrade stream habitat.

The Wolf Fork sub-basin is still in good condition, but further removal of timber on private land in the upper reaches will likely reduce bull trout/Dolly Varden numbers substantially as a result of increased siltation. Additional road construction, over-use by livestock, recreational residence construction, and resulting riparian vegetation reduction would increase water temperatures above those conducive to bull trout/Dolly Varden. The Robinson Fork suffers from siltation and marginal water temperatures. Habitat quality is poor due to past logging and agricultural practices.

The South Fork Touchet watershed has been severely degraded due to logging, grazing with resulting siltation, and high water temperatures.

Harvest Management--The North Fork Touchet, Wolf Fork and Robinson Fork are closed to the harvest of bull trout/Dolly Varden.

Hatchery--Hatchery-origin adult and juvenile steelhead are present in the North Fork Touchet. Introduced brown trout are also present in low densities above the town of Dayton and are found in the lower reaches of the North and Wolf forks. Subsequent releases have been moved downstream of Dayton. Brown trout have likely displaced some bull trout/Dolly Varden presence in the lower North Fork system.

Interactions with steelhead were examined in the Wolf Fork in 1992 by WDFW (Martin et al. 1992). The study showed that some competition between juvenile bull trout and

juvenile steelhead may be occurring for rearing habitat based on small habitat preference shifts where the two species overlapped. Small numbers of brown trout have been documented in the Wolf Fork. They probably originated from hatchery releases followed by natural reproduction in the North Fork Touchet River. Brown trout are a concern because of their predatory nature and because they can compete with bull trout/Dolly Varden for food and space. Releases of rainbow and brown trout were made in the Wolf Fork sporadically until 1990 but ended at that time.

WALLA WALLA - MILL CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Mill Creek bull trout/Dolly Varden have been identified as a distinct stock based on their geographical distribution. Both resident and fluvial life history forms are present in the upper reaches, but the latter are more typical of the adfluvial form based on their larger size. Spawning occurs from early September through October. DNA samples were taken for analysis during summer, 1995, but results were not available when this report was written.

This stock has been geographically isolated due to over-appropriation of water rights, numerous irrigation diversions, removal of riparian vegetation, and resulting high water temperatures in lower Mill Creek and the Walla Walla River. The potential for significant numbers of adfluvial bull trout/Dolly Varden using the Walla Walla, Touchet, and Columbia rivers is low. The majority of bull trout/Dolly Varden in Mill Creek are confined to the City of Walla Walla Watershed inside the Umatilla National Forest in Washington and Oregon. All spawning occurs in the municipal watershed or National Forest. Spawn timing is from early September through October.

Mill Creek bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

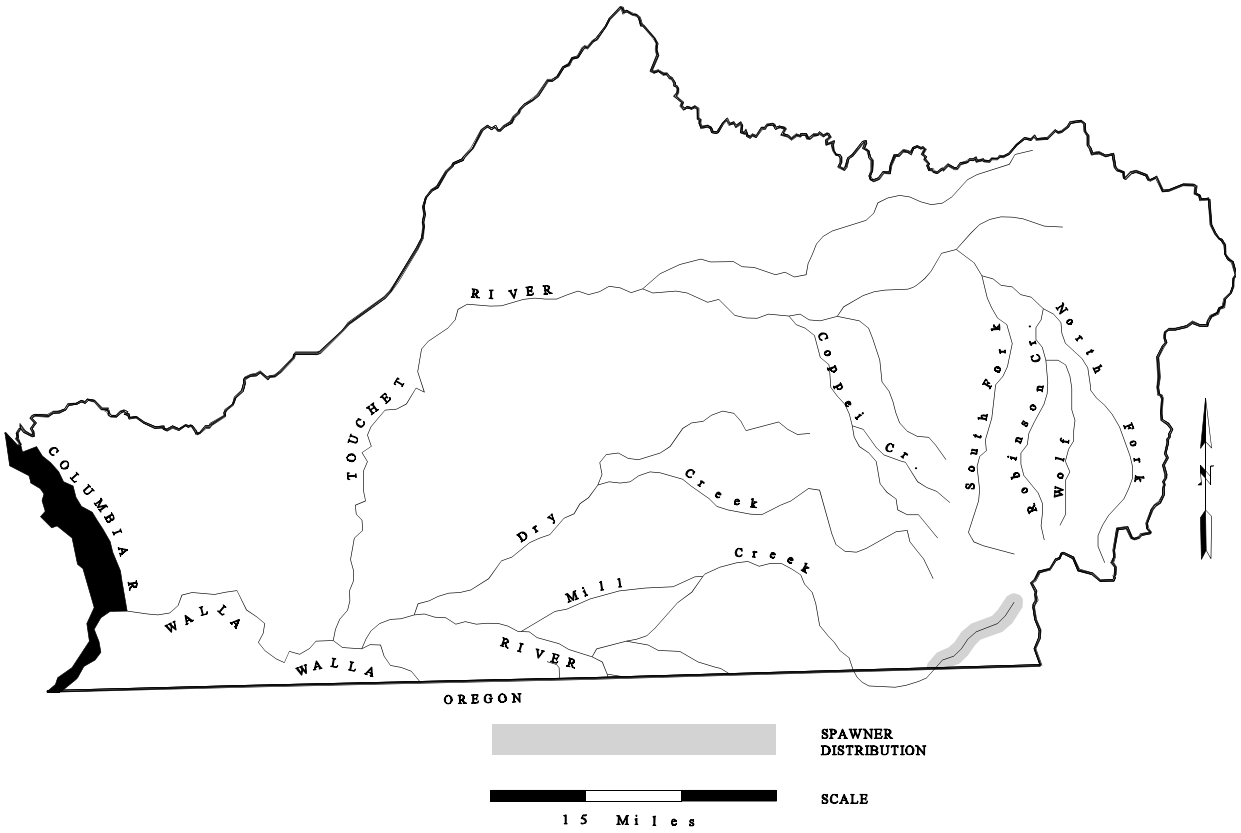
The status of Mill Creek bull trout/Dolly Varden is Healthy. This determination was based on high densities of juveniles, strong representation of year classes, stable distribution of age groups, and strong, consistent spawning over the four-year survey period. WDFW and Forest Service personnel conducted spawner surveys and redd counts in Mill Creek during 1990, 1991, 1992, 1994, and 1995. Juvenile densities (fish per 100 m^2) were estimated during the earlier surveys. An estimate of the population in the survey area was made from foot survey and electrofishing data originally collected by WDFW. The Forest Service has assumed the duty of annual spawner surveys. Data quality is considered good.

The Oregon Department of Fish and Wildlife has described the status of Mill Creek bull trout/Dolly Varden as being of “special concern” because of an apparent decrease in the number of redds counted from 1994 to 1997 on National Forest land in Oregon and Washington (1994--191; 1995--165; 1996--134; 1997--118) (Buchanan, Hanson and Hooton 1997).

STOCK DEFINITION PROFILE for Mill Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawning									■	■	■		Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

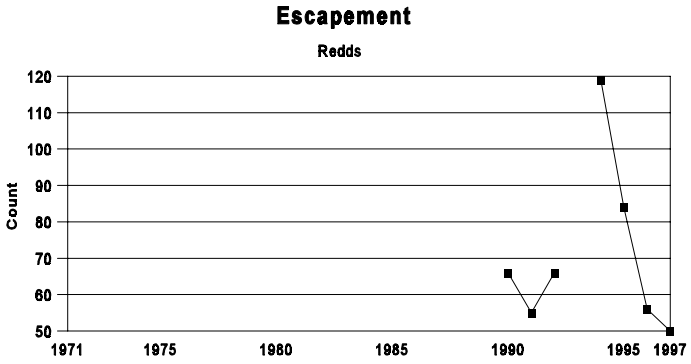
STOCK STATUS PROFILE for Mill Creek Bull Trout/Dolly Varden

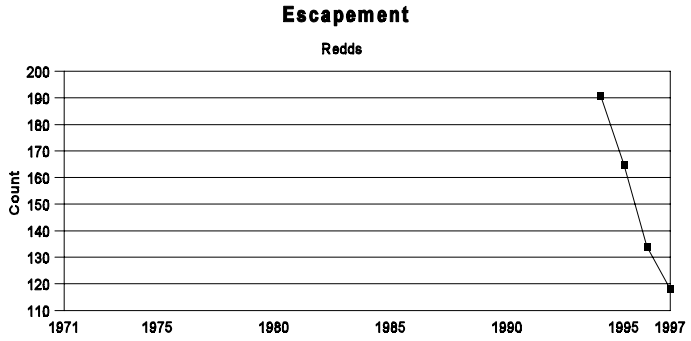
STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds	ESCAPE Redds	FW PROD No/100m^2	RUNSIZE Total
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	66			
91	55		14.0	
92	66		13.4	3,925
93				
94	119	191		
95	84	165		
96	56	134		
97	50	118		

Column 1: Index area redd counts.
Colunm 2: Total redd counts.





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

FACTORS AFFECTING PRODUCTION

Habitat--The upper section of Mill Creek (within city of Walla Walla Watershed and Umatilla National Forest) is pristine. The middle section (from city watershed diversion to the city of Walla Walla) has been degraded due to road and homesite construction. Loss of riparian habitat with resultant lack of large woody debris and increased water temperatures limits water quality for bull trout/Dolly Varden. Also, logging and agriculture below the watershed introduce sediment into the system that may degrade the habitat quality. The lower section (from the city to the mouth) has been severely degraded and is unfit for bull trout/Dolly Varden due to high water temperatures and siltation. The lower Walla Walla basin has been subjected to massive gravel removal operations over the years and is also subject to the effects of urbanization and over 100 years of agricultural use. Severe flooding in the winter of 1996 caused significant bedload movement in Mill Creek. In-stream work with heavy equipment to repair flood damage on private land in the summer of 1996 may have interrupted migration or killed fish (Buchanan, Hanson and Hooton 1997).

Harvest Management--In addition to WDFW regulation closure, bull trout/Dolly Varden are further protected because the city of Walla Walla restricts access to the watershed.

Hatchery--The middle and lower sections of Mill Creek receive annual releases of rainbow trout. No hatchery-origin salmonids have been observed in upper Mill Creek. Interactions between hatchery-origin fish and bull trout/Dolly Varden have not been examined.

TUCANNON -- UPPER TUCANNON BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The Tucannon River originates in the Wenaha-Tucannon Wilderness of the Umatilla National Forest in the central Blue Mountains of Washington and enters the Snake River upstream of the Palouse River mouth. The bull trout/Dolly Varden in the upper Tucannon River (above RM 34) and its tributaries (Cummings, Panjab, Sheep, and Bear creeks) and Pataha Creek are likely a distinct stock. Most major tributaries have resident and fluvial life history forms. Adfluvial fish are also present in the mainstem upper Tucannon as documented with one radio-tagged fish monitored in 1993. Within a few days, it traveled from above the Tucannon hatchery to the Starbuck area where the signal was lost. It appears to have been heading for the Snake River.

Cummings Creek is the most downstream of the upper Tucannon tributaries containing bull trout/Dolly Varden. Stream surveys in 1991 documented bull trout/Dolly Varden presence approximately six miles upstream of the mouth. Based on size, adfluvial, fluvial, and resident forms are believed to be present. Spawning areas have not been identified.

Panjab Creek is the next sub-basin containing bull trout/Dolly Varden. Surveys by the U. S. Forest Service in 1995 have documented spawning in the lower reach. Visual observations suggest that resident and fluvial life history forms are present.

Sheep Creek is a short-run, steep tributary of about 2.5 miles and is located between Panjab and Bear Creeks. A culvert outfall located approximately one-half mile above its mouth restricts upstream movement and access for bull trout/Dolly Varden. Forest Service personnel documented bull trout/Dolly Varden presence (juveniles only) in their 1992 survey. Because no adults have been observed, life history information is lacking.

Bear Creek is one of the uppermost sub-basins of the upper Tucannon containing bull trout/Dolly Varden and drains from north to south. Bull trout/Dolly Varden presence has been documented through surveys conducted by Forest Service personnel from early September to early November in 1994 and 1995 covering the lower half-mile. Visual observations indicate resident, fluvial, and adfluvial life history forms are present.

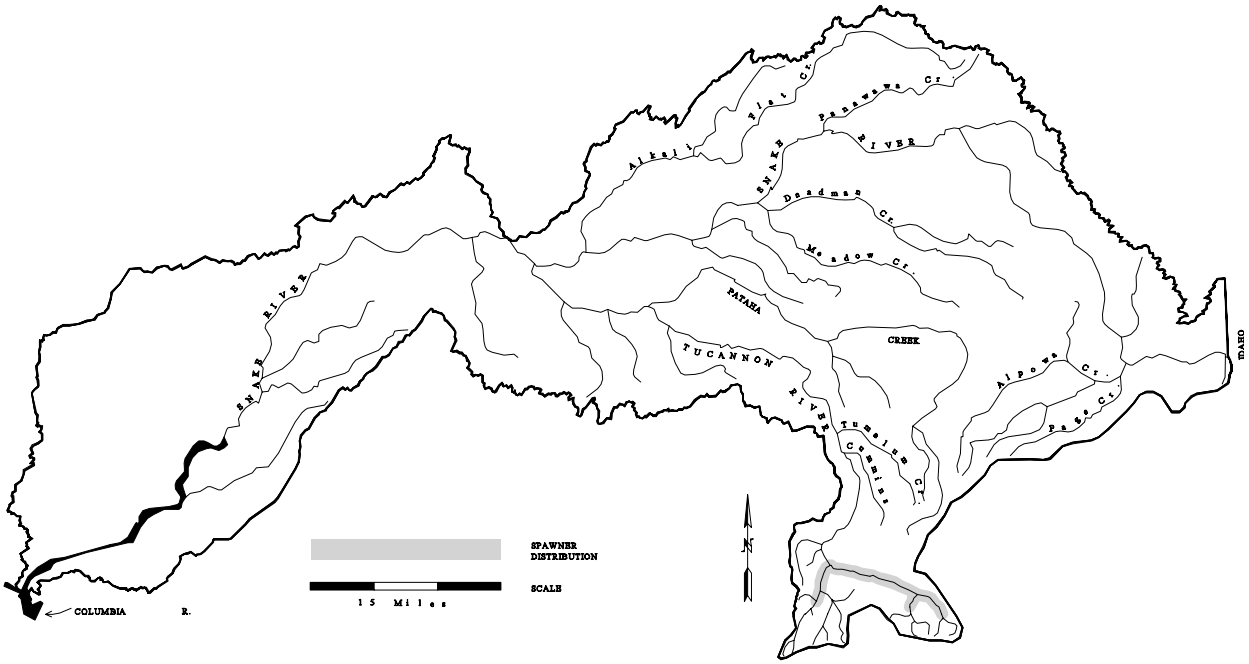
U.S. Forest Service employees have indicated that resident life history forms of bull trout/Dolly Varden are still present in the headwaters of Pataha Creek.

Upper Tucannon bull trout/Dolly Varden are native and are maintained by wild production.

STOCK DEFINITION PROFILE for Upper Tucannon Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawning									■	■	■		Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

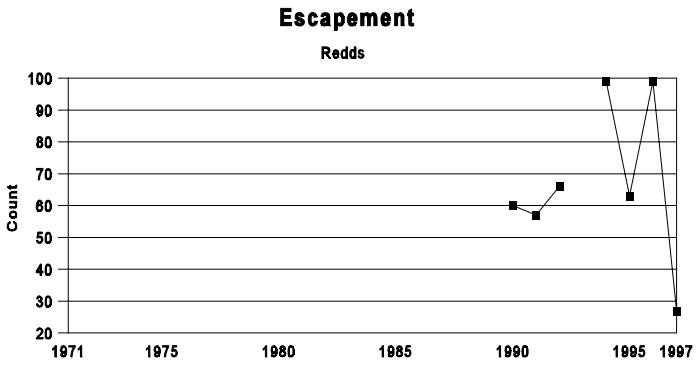
STOCK STATUS PROFILE for Upper Tucannon Bull Trout/Dolly Varden

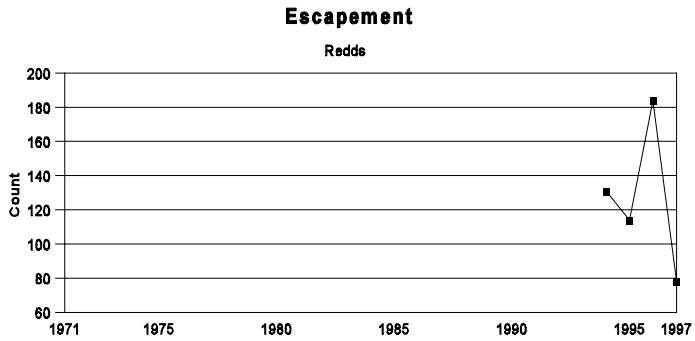
STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds	ESCAPE Redds	FW PROD No/100m2	RUNSIZE Total
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	60		5.6	4,853
91	57			
92	66			
93				
94	99	131		
95	63	114		
96	99	184		
97	27	78		

Column 1: Index area redd counts.
Column 2: Total redd counts.





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

STOCK STATUS

The status of bull trout/Dolly Varden in the upper Tucannon River is Healthy based on spawning ground surveys and juvenile density studies. WDFW and Forest Service personnel began counting redds in the upper Tucannon in 1990. Juvenile and adult densities and total population size (juveniles and adults) were estimated in 1991 and 1992. Data quality is considered good and represents the most reliable bull trout/Dolly Varden information in southeast Washington.

FACTORS AFFECTING PRODUCTION

Habitat--The upper Tucannon River basin (RM 34 to RM 53) lies within intermixed WDFW and U.S. Forest Service lands. The substrate of the Tucannon differs from that of many of the drainages in the Blue Mountains and consists of round cobble (similar to that in the Touchet, Walla Walla, and Grande Ronde Rivers) as opposed to the angular basalt-laden tributary waters.

Upper Tucannon basin land uses are primarily recreation and logging. Some grazing is allowed on Forest Service lands. The Tucannon headwaters are located in the Wenaha Wilderness which affords good habitat protection. Outside the Wenaha Wilderness, timber harvest, and recreation have degraded habitat in some areas of intense management and use. Bull trout/Dolly Varden rear in the entire reach, but spawning occurs primarily in the upper ten to twelve miles. Identification of the upper Tucannon as critical habitat for Endangered Species Act-listed spring chinook will likely strengthen habitat protection in the future.

WDFW and federal agencies have taken actions to improve riparian habitat in the upper Tucannon basin. Additionally, campgrounds have been closed to reduce human effects on fish habitat.

The impacts of the late winter 1996 floods in southeast Washington are unknown. Considerable erosion and channel changes occurred in all major drainage basins in the area. However large amounts of woody debris entered the channel as a result of the flood, and have been instrumental in pool development since the flood. Both of these developments should be beneficial to bull trout/Dolly Varden. Riparian habitat in the upper Tucannon remains in good condition.

Bear Creek habitat is in good condition and is likely to remain so as it originates in the Wenaha Tucannon Wilderness.

Sheep Creek habitat also remains in good condition as does that of Panjab Creek.

Cummings Creek habitat has been impacted by logging and grazing. Its condition should be classed as fair. The 1996 flood may have been beneficial to Cummings

Creek by flushing accumulated sediments and creating many new large pools with the introduction of new large woody debris.

Lower Pataha Creek, from Columbia Center to the mouth, is subject to high summer water temperatures, turbidity, erosion, siltation, and otherwise poor water quality due to agricultural use and grazing, and the presence of State Highway 12. Past logging-related road construction up the creek bottom, timber removal, and grazing were likely the primary factors in the decline of this stock. The road has since been closed.

Harvest Management--Harvest of bull trout/Dolly Varden is allowed in the upper Tucannon from 400 feet above the hatchery intake upstream to Panjab Creek from June 1 through October 31. A two-fish per day bag limit with a minimum size limit of 20 inches is in effect. All tributaries and the main river where bull trout/Dolly Varden spawn are closed to the harvest of bull trout/Dolly Varden.

Hatchery--There is some potential for interaction between wild bull trout/Dolly Varden and hatchery-origin spring chinook and steelhead adults and juveniles, but this potential has been greatly diminished due to low numbers of adult chinook spawners. Martin et al. (1992) and Underwood et al. (1995) have investigated interactions among bull trout/Dolly Varden, steelhead, and spring chinook in the Tucannon basin. In general, they found no negative interactions between sympatric bull trout/Dolly Varden and hatchery-origin spring chinook and steelhead because bull trout/Dolly Varden were using different microhabitats from those used by the other species.

ASOTIN CREEK -- ASOTIN CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Asotin Creek originates in the eastern portion of Washington's Blue Mountains and drains east to its entry into the Snake River upstream of Clarkston at Asotin on the Washington/ Idaho border. This stock is considered distinct based on its geographic distribution. Primary tributaries consist of Pintler, George, Charley, South Fork Asotin, North Fork Asotin, Lick, Middle Branch North Fork Asotin, and South Fork of North Fork Asotin creeks. WDFW and U.S. Forest Service surveys have found bull trout/Dolly Varden only in Charley Creek, the North Fork, the Middle Branch, and the South Fork of North Fork Asotin Creek. Visual assessment indicates resident and fluvial life history forms are present. Movement of fluvial fish between branches of the North Fork probably occurs. Adfluvial bull trout/Dolly Varden were likely present prior to European settlement of the lower Asotin Creek valley and the resulting water diversions and withdrawals. There is a remote possibility that they may still be present. Bull trout/Dolly Varden were probably present historically in the headwaters of Pintler, George, and Lick creeks, and the South Fork of Asotin Creek, and movement among these sub-basins also likely occurred.

Charley Creek is located one mile downstream from the mouth of the North Fork Asotin Creek. Charley Creek bull trout/Dolly Varden have been confirmed to be present and are isolated from others in the basin due to physical and temperature barriers. They were likely contiguous with other fluvial and even adfluvial forms and probably freely intermixed prior to the creation of human-caused obstacles. The resident forms may be distinct in the sub-basin. Both large and very small bull trout/Dolly Varden have been seen in the headwaters.

North Fork Asotin Creek bull trout/Dolly Varden were historically distributed throughout that drainage. Up to the mid-1970s, they were found in the headwaters near the Clearwater Guard Station and also in Cougar Creek. Spawning surveys were performed by WDFW in 1990, 1991 and 1992 in the lower four miles. Fish were observed, but no spawning was confirmed. The U.S. Forest Service recommends that the upper six miles be surveyed. Electrofishing has produced fish in the 150 mm to 250 mm range, indicative of the resident life history form.

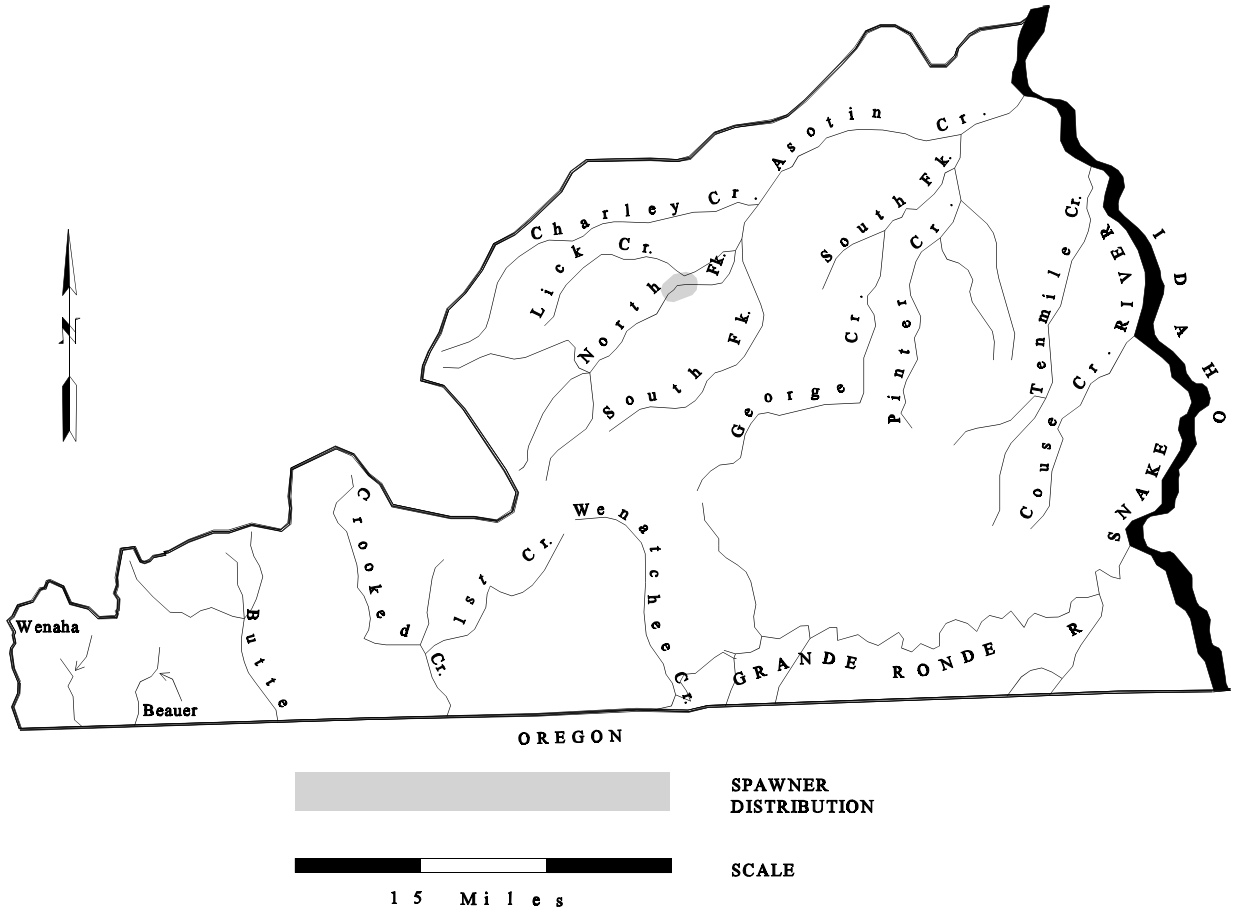
The Middle Branch North Fork Asotin Creek was surveyed by Forest Service personnel in August, 1993. Observed fish were likely the resident life history form and were found in the lower 2.5 miles.

The lower 1.5 miles of the South Fork of the North Fork of Asotin Creek was also surveyed by the Forest Service in July 1993. Observed fish were similar in size to

STOCK DEFINITION PROFILE for Asotin Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning	Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Asotin Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Poor

Return Years	ESCAPE Redds	FW PROD No/100m^2		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	0			
91	0	0.4		
92	0			
93				
94				
95				
96	3			
97	0			

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

those found in the Middle Branch and are thought to be resident forms. Bull trout/Dolly Varden movement among the tributaries of the North Fork likely occurs.

Spawn timing is unknown.

Asotin Creek bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

The status of bull trout/Dolly Varden Asotin Creek stock is Unknown but may be Critical based upon very low abundance. Trend data are needed to establish stock status. WDFW initiated bull trout/Dolly Varden presence/absence surveys and spawner surveys beginning in 1990 which were subsequently assumed by U.S. Forest Service personnel in 1996. Of the basins in southeast Washington containing bull trout/Dolly Varden, Asotin Creek is probably the one with the most problems and may have the highest potential for extirpation.

Forest Service personnel surveyed 16 miles of Charley Creek in July 1993 and counted only six bull trout/Dolly Varden. For the purpose of designating stock status, the quality of this information is considered poor. No spawning surveys have been conducted, and no other quantitative data are available. WDFW personnel found no bull trout/Dolly Varden in a 1994 survey.

A survey of juvenile density (fish per 100 m^2) was conducted in the North Fork by WDFW in 1991, and spawner surveys were done in 1990 and 1992. Data quality from these surveys is considered good.

The only quantitative data are for the Middle Branch from the 1993 Forest Service snorkel surveys in which eight bull trout/Dolly Varden were documented. Data quality from this survey is considered poor. No spawner surveys have been conducted.

The only quantitative data available for the South Fork of the North Fork Asotin Creek are from the 1993 Forest Service survey where seven bull trout/Dolly Varden were observed. The quality of this information is considered poor. No spawner surveys have been undertaken.

FACTORS AFFECTING PRODUCTION

Habitat--Habitat degradation throughout the basin resulting from timber removal, road construction, and livestock grazing has jeopardized bull trout/Dolly Varden in the upper reaches and has been further compounded downstream with agriculture-related activities, road construction, riparian zone destruction, and water withdrawals. The

lower tributaries and all of the mainstem Asotin Creek exhibit siltation problems and high summer stream temperatures.

The upper portion of Charley Creek lies primarily in the Umatilla National Forest and remains in good condition. The lower reach has been severely degraded due to livestock grazing and also from the construction of a small recreational fishing impoundment and dam in the early 1960s, which blocked upstream movement of bull trout/Dolly Varden. The upper ends of the three North Fork tributaries are in relatively good condition, but floods in 1964 and 1968 and loss of large woody debris reduced pool numbers from 15 to 30 pools per mile to nine pools per mile. These areas represent the best available habitat within this basin for bull trout/Dolly Varden but are still subject to high summer water temperatures which may be the most important limiting factor. The effects of the 1996 floods have not been assessed. Damage may have occurred in some areas, especially in the mainstem Asotin Creek where high water temperatures, lack of riparian vegetation, siltation, and irrigation withdrawals have been long-standing problems for fish welfare. The upper tributaries may have benefitted from the flood if large woody debris entered the channel and created more large pool habitat. High water temperatures will remain a problem for bull trout/Dolly Varden in this basin until riparian habitat can be improved.

Joint efforts are underway among the Natural Resource Conservation Service, private landowners and WDFW to restore in-stream and riparian habitat in the lower reaches, but late winter floods in 1996 and 1997 may have undone much, if not all, work done to date.

Harvest Management--Asotin Creek and its tributaries are closed to the harvest of bull trout/Dolly Varden. Regulations and difficult access to the tributaries provide good protection for bull trout/Dolly Varden from anglers are fishing for other species.

Hatchery--Rainbow trout releases into the mainstem Asotin Creek have been confined to the lower portion of the stream. No trout have been released into Charley Creek since the mid-1960s. In the North Fork, interactions with hatchery-origin adult steelhead have been observed in the creek. Some hatchery-origin rainbow trout may enter the North Fork from the mainstem Asotin Creek. The lower five miles of the North Fork were heavily planted with hatchery rainbows through 1990. Decreasing numbers were planted from 1991 to 1994 and, releases were discontinued in 1995 due to bull trout/Dolly Varden and other wild fish concerns. No hatchery-origin salmonids have been observed in either the Middle Branch or the South Fork of the North Fork.

GRANDE RONDE -- WENAHA BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bull trout/Dolly Varden are found Crooked Creek, Butte Creek, and the North Fork Wenaha River which all originate in the Blue Mountains of Washington and drain south to the Wenaha River, a tributary of the Grande Ronde River which enters the Snake River upstream from the town of Asotin. The stock is considered distinct based on its geographic distribution. Crooked Creek, Butte Creek and the North Fork Wenaha are all believed to contain resident, fluvial, and adfluvial life history forms of bull trout/Dolly Varden. Resident fish are probably isolated in each sub-basin, while fluvial and adfluvial forms likely move freely throughout the basin.

According to U. S. Forest Service personnel, bull trout/Dolly Varden are present in good numbers in upper Crooked Creek. Forest Service summer surveys in 1993 and 1994 found large and small bull trout/Dolly Varden in First, Second, and Third creeks, tributaries of Crooked Creek. Third Creek has not been systematically surveyed. All life history forms may be present in Crooked Creek, given observed fish sizes. The Forest Service fish biologist with the Pomeroy Ranger District on the Umatilla National Forest believes the tributary populations are resident fish, and those in the mainstem Crooked Creek are fluvial. Adfluvial forms may enter from the Wenaha and Grande Ronde rivers.

Butte Creek lies between the North Fork Wenaha River and Crooked Creek. Forest Service personnel surveyed Butte Creek in the summer of 1995 and found good numbers of bull trout/Dolly Varden. Most of the fish were in the upper mainstem and in the West Fork up to the falls (about 0.5 mile). No bull trout/Dolly Varden were found in the East Fork or above the falls in the West Fork. Butte Creek bull trout/Dolly Varden are thought to be resident and fluvial fish. The larger fish in the Forest Service survey measured 457 mm to 508 mm.

The North Fork Wenaha River is located between Mill Creek to the west and Butte Creek to the east. Forest Service personnel surveyed the lower 1.5 miles in the late summer of 1994. They reported that resident and fluvial life history forms were abundant. The upper reach has not been surveyed.

The Oregon Department of Fish and Wildlife collected fin clip samples from juvenile bull trout/Dolly Varden in Butte Creek in the summer of 1995 for DNA analysis. Results were not available at the time this report was written.

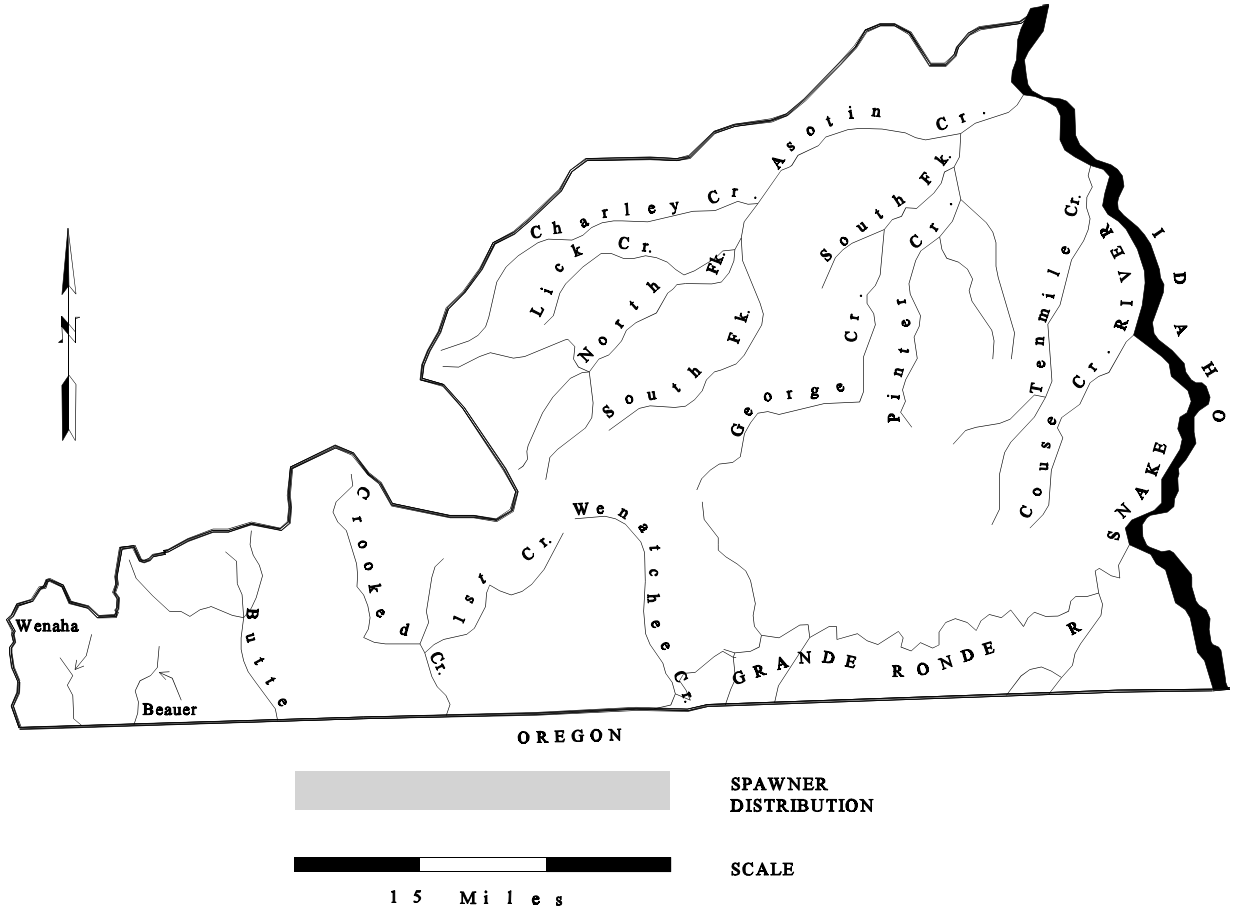
Spawn timing is unknown.

STOCK DEFINITION PROFILE for Wenaha Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Wenaha Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Wenaha bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

Stock status is Unknown but may be Healthy due to the remote location of the three drainages. All originate within the Wenaha-Tucannon Wilderness. The only quantitative data available for this stock are from Forest Service surveys conducted during 1993, 1994, and 1995. Data quality is considered poor. The Oregon Department of Fish and Wildlife has described Wenaha bull trout/Dolly Varden in Oregon as being at low risk of extinction because most of the watershed is located within the Wenaha Tucannon Wilderness.

FACTORS AFFECTING PRODUCTION

Habitat--The habitat in the three sub-basin tributaries is considered good to excellent with the exception of the lower 2.5 miles of Crooked Creek. No bull trout/Dolly Varden have been found in this reach. This may be due in part to its open north-south exposure and resulting high temperature. High temperature is likely seasonal but needs further investigation.

High summer water temperatures in the mainstem Grande Ronde preclude year-round residence. Fish probably ascend into the tributaries when the temperatures rise.

Harvest Management--All three tributaries are closed to the harvest of bull trout/Dolly Varden. Incidental catches by back country recreationists fishing for resident rainbow trout in the summer and fall occur periodically.

Hatchery--Adult hatchery-origin steelhead may be present in each of the sub-basins, but this is unlikely. Interactions between them and wild bull trout/Dolly Varden have not been examined.

OVERVIEW -- YAKIMA BULL TROUT/DOLLY VARDEN STOCKS

YAKIMA
AHTANUM CREEK
NACHES
RIMROCK LAKE
BUMPING LAKE
NORTH FORK TEANAWAY
CLE ELUM/WAPTUS LAKES
KACHESS LAKE
KEECHELUS LAKE

STOCK DEFINITION AND OVERVIEW

In the past, wild bull trout/Dolly Varden occurred throughout the Yakima River subbasin, but they are now fractured into isolated stocks. Although bull trout/Dolly Varden were probably never as abundant as other salmonids in the Yakima basin, they were certainly more abundant and more widely distributed than they are today. Currently, nine bull trout/Dolly Varden stocks have been identified in the basin. Distinct stocks are present in the Yakima River, Ahtanum Creek, Naches River, Rimrock Lake, Bumping Lake, North Fork Teanaway River, Cle Elum/Waptus Lakes, Kachess Lake, and Keechelus Lake. All nine bull trout/Dolly Varden stocks in the Yakima basin are native fish sustained by wild production, as there are no hatchery bull trout/Dolly Varden stocks in Washington state.

There is no information to indicate whether these are genetically distinct stocks. The stocks are treated separately due to geographical, physical and thermal isolation of the spawning populations. More or fewer stocks may be identified after additional data are collected and comprehensive genetic information is available.

Three bull trout/Dolly Varden life history forms are present in the Yakima basin: adfluvial, fluvial and resident. Adfluvial stocks occur in Rimrock, Bumping, Kachess, Keechelus and Cle Elum/Waptus lakes. There is a fluvial stock in the mainstem Yakima River, and a resident stock in Ahtanum Creek. Fluvial/resident forms occur in the Naches River drainage and in the North Fork Teanaway drainage. It is possible that anadromous forms also occurred in the Yakima basin in the past. Run timing of the Keechelus Lake stock and the spawning population in the SF Tieton River (part of the Rimrock Lake stock) is distinct. Run timing for other Yakima stocks is not distinct from other Washington state bull trout/Dolly Varden or is unknown.

STOCK STATUS

Of the nine stocks identified one is Healthy, one is Depressed, six are Critical and one is Unknown. Additional data are needed to determine the status of the unknown stock.

YAKIMA -- YAKIMA BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Yakima bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Bull trout/Dolly Varden were thought to be extirpated in the lower Yakima River many years ago, probably before the 1950s. However, during electrofishing surveys in June 1997, WDFW biologists caught and released one 278 mm bull trout near Benton City. Although fluvial bull trout/Dolly Varden are present in the mainstem of the upper Yakima River, they are infrequently encountered. Currently, most bull trout/Dolly Varden that inhabit the upper Yakima River are probably fish that outmigrate from upper river tributaries and juvenile or sub-adult fish which are flushed out of upper river reservoirs during irrigation water releases. Fluvial bull trout/Dolly Varden grow and mature in the mainstem and then migrate during the late summer into upper tributaries to spawn.

There are a few references (mostly old catch records) that indicate the presence of bull trout/Dolly Varden in Yakima River tributaries including Satus Creek, Cowiche Creek, Coleman Creek and the Cle Elum River. Some of these records date back to the 1930s. The fish caught in Cowiche and Satus creeks were probably strays or misidentified brook trout (old catch records indicate only one bull trout/Dolly Varden was captured in each of these streams). We do not know if bull trout/Dolly Varden still occur in Coleman Creek or in the Cle Elum River below Cle Elum Lake Dam or if they are isolated resident stocks. In all streams where bull trout/Dolly Varden are noted in the historical catch records relatively few fish were recorded compared to other gamefish. Whether this is a reflection of historically low population abundance is difficult to tell. In May 1996 one 545 mm bull trout was illegally caught in Easton Lake (a 238-acre reservoir of the upper Yakima River). There are a few anecdotal reports of anglers catching bull trout as well. We do not know if these fish are representative of an isolated adfluvial population inhabiting the lake or of the Yakima River fluvial stock.

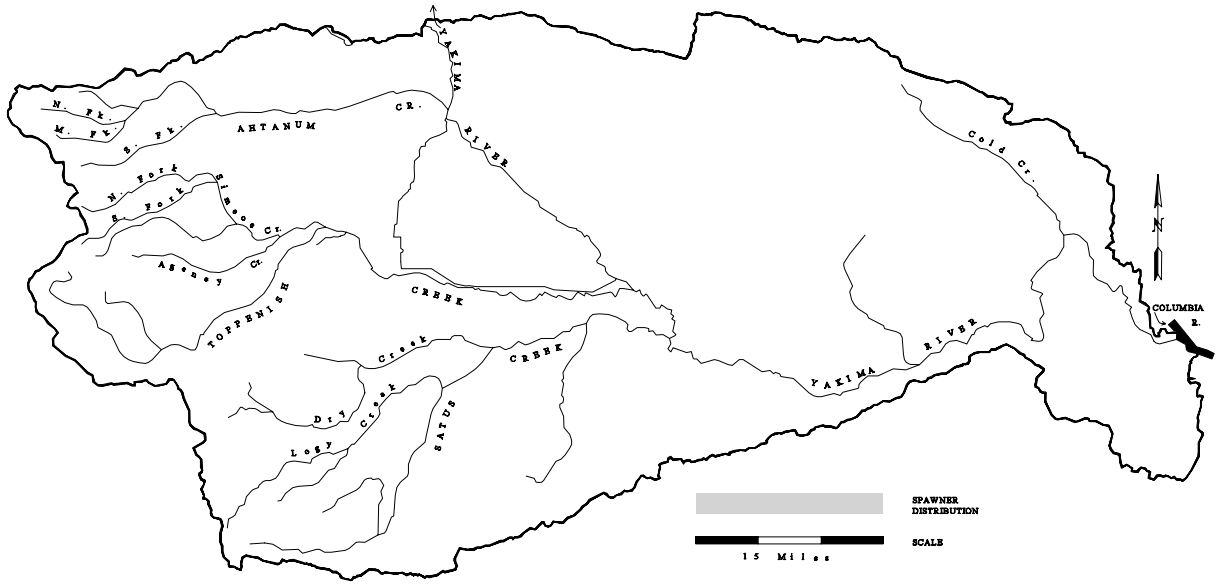
Until information is collected to determine otherwise, all bull trout/Dolly Varden in the upper Yakima River mainstem will be considered as one stock with a fluvial life history pattern. An exception is the North Fork Teanaway River, which is considered a separate isolated resident stock (see North Fork Teanaway stock report). For now, the Yakima fluvial stock is assumed to be composed of fish that inhabit the mainstem between Roza Dam and the upper reservoir dams (i.e., Cle Elum, Kachess and Keechelus dams). Although the genetic characteristics of the stock have not been determined, bull trout/Dolly Varden in the mainstem of the Yakima River are considered distinct from other Yakima subbasin stocks based on physical, geographical and thermal isolating factors (dams, warm water temperatures, irrigation diversions, etc.).

STOCK DEFINITION PROFILE for Yakima Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning	Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Yakima Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD Index Total			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	0			
91	0			
92	2			
93	0			
94	1			
95	1			
96	0			
97	0			

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

We do not know where and when spawning occurs. As with other stocks in the Yakima subbasin, spawning probably occurs in September. The few fish that have been caught in recent years range in size from 305 mm to 559 mm. There is no information on age at maturity or any other biological characteristics (e.g., sex ratio, fecundity, etc.).

Yakima bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

The status of the stock is Critical based on chronically low numbers of fish encountered in index areas. The stock is likely suffering from a long-term negative trend and decreases in stock fitness. Only a few bull trout/Dolly Varden have been found after eight years of intensive field monitoring of trout populations in the mainstem of the upper Yakima River (field monitoring began in 1990). Standardized electrofishing surveys conducted annually during September and October in five 4.5 kilometer sections (index areas) of the river have turned up only four bull trout/Dolly Varden (three near Cle Elum and one near Ellensburg). Index areas are located from Cle Elum to Roza Dam. Data quality is excellent. In 1993, a single bull trout/Dolly Varden was captured in a trap in Swauk Creek 200 meters above its mouth. The fish was migrating upstream, apparently out of the Yakima River. There are no index areas in the Yakima River above Easton Lake. More field investigations are needed in this area.

FACTORS AFFECTING PRODUCTION

Habitat--Dams without fish passage capability that were built during the early 1900s to create the large irrigation storage reservoirs in the upper Yakima River drainage fragmented and isolated bull trout/Dolly Varden populations. The dams prevented annual migrations to upper spawning tributaries. The few remaining spawning areas below the dams were affected by unscreened irrigation diversions and low-water conditions in tributary streams created by periodic natural drought conditions and irrigation water withdrawals. These conditions prevented upstream migration and caused stranding of fish in pools or irrigation canals which increased mortality of adult and juvenile bull trout/Dolly Varden. Currently, irrigation diversions are screened to prevent fish from becoming stranded in canals or in agricultural fields, but migration barriers due to low-water conditions are still a concern.

Development in or along the floodplain/shorelines and diking continue to reduce shoreline cover and to increase water temperatures and sediment loads. Grazing, non-point agricultural runoff and irrigation returns with high sediment loads degrade water quality, cover spawning and rearing gravels with sediment, impair fish health and impede fish growth. Timber harvests near or in riparian corridors in the upper watershed combined with excessive road densities contribute greatly to increased water temperatures, sediment loads and poor water quality in all downstream areas.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1986 with a one-fish catch limit and an eight-inch minimum size limit in streams. Additionally, fishing for bull trout/Dolly Varden was prohibited from August 15 to September 30 to protect spawning fish. Beginning in 1992 fishing for bull trout/Dolly Varden was prohibited in the Yakima River drainage. Since 1990 the use of bait and barbed treble hooks has been prohibited in the upper Yakima River (from Roza Dam to Keechelus Dam), thereby reducing the mortality rate of released bull trout. Beginning in 1998 this fishing regulation will apply to other upper Yakima River tributaries as well, including the Cle Elum River, Kachess River, Naneum Creek, Swauk Creek, Teanaway River and Umtanum Creek.

Very little historical harvest information exists for bull trout/Dolly Varden in the Yakima River. They have been observed during creel checks but probably have been targeted by few anglers due to their lower abundance and because they were not as highly regarded as other gamefish.

Although angling impacts and harvest are not entirely known, they may not have been as significant in the mainstem as in upper tributary areas. It is likely that bull trout/Dolly Varden were so severely affected by upriver dams which blocked passage to spawning areas and by low flow conditions and irrigation diversions that the population crashed in the early 1900s. Although angling and harvest probably had some effect, compared to dams and diversions, it was probably minor.

Hatchery--Hatchery rainbow trout (fry/fingerlings and catchable-size trout) and steelhead have been heavily stocked into the upper and lower Yakima River since the early 1930s. Exotic fish species such as brown trout and brook trout were stocked less frequently into sloughs, beaver ponds and tributaries. In the early 1930's bass, catfish and crappie were stocked in the lower river (Tri-Cities area). It is not known what effect this stocking had on bull trout/Dolly Varden, but it is likely that they were negatively impacted. Impacts to bull trout/Dolly Varden probably included competition for food and space, predation on bull trout/Dolly Varden juveniles, increased angler harvest rates, and hooking mortality associated with the incidental catch-and-release of bull trout/Dolly Varden. Potential bull trout/Dolly Varden hybridization with brook trout is also a concern.

With the exception of steelhead smolts stocked into a few tributary streams, the stocking programs were eliminated in the mainstem Yakima River in the early 1980s and in most tributaries by the early 1990s to avoid potential impacts to native fish species, including bull trout/Dolly Varden.

Currently, there are plans to supplement depressed spring chinook salmon populations in the Yakima River subbasin. A hatchery facility will be constructed at Cle Elum with several acclimation ponds in the upper basin. Biologists responsible for managing the

facility believe that stocking spring chinook in the basin will not impact bull trout/Dolly Varden stocks.

Historically, bull trout/Dolly Varden probably benefitted from the presence of anadromous salmonids such as spring chinook. The downstream drift of eggs released from spawning salmon provided food for bull trout/Dolly Varden and other resident fishes, but more importantly the presence of decaying salmon carcasses greatly benefited juvenile salmon and resident fishes by nutrient recycling. Generally, in drainages colonized by natural anadromous salmon and steelhead the bull trout/Dolly Varden have successfully co-existed by occupying a slightly different ecological niche.

However, in many areas where bull trout/Dolly Varden currently exist, habitat conditions have deteriorated and natural predator/prey balances have been upset. Bull trout/Dolly Varden populations are at or near critically low levels in many areas of the basin. Concern exists over stocking large numbers of hatchery fish into an environment already unfavorable for bull trout/Dolly Varden production. Great care should be taken to avoid actions that will push bull trout/Dolly Varden to extinction.

YAKIMA -- AHTANUM CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Ahtanum Creek bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Bull trout/Dolly Varden in Ahtanum Creek, a tributary of the Yakima River, originated from native fluvial/resident life history forms that occurred throughout the Yakima River subbasin. Ahtanum Creek bull trout/Dolly Varden are now isolated from fish in the lower Yakima River due to thermal barriers and total dewatering of lower Ahtanum Creek below RM 19.7 at Wapato Irrigation Diversion by irrigation water withdrawals.

Although bull trout/Dolly Varden are present in the mainstem Ahtanum Creek (above RM 19.7) they are probably more abundant in the upper portion of the drainage, particularly in the North, Middle and South forks where habitat conditions are more favorable. Until information is collected to determine otherwise, bull trout/Dolly Varden isolated in the Ahtanum Creek drainage will be considered as one stock with a resident life history pattern.

Information on bull trout/Dolly Varden spawning location and timing is available for the North and Middle Fork. Bull trout/Dolly Varden also occur in Shellneck Creek, a small tributary of the upper North Fork. The few bull trout/Dolly Varden redds observed in this small creek are included in the redd count for the North Fork. It is likely that bull trout spawning in the South Fork as well, but redd counts have not been conducted there yet. Spawning occurs in September. The majority of adult spawners range from 200 mm to 356 mm in total length. The age at maturity, sex ratio, fecundity, timing of fry emergence, and survival rates are all unknown.

STOCK STATUS

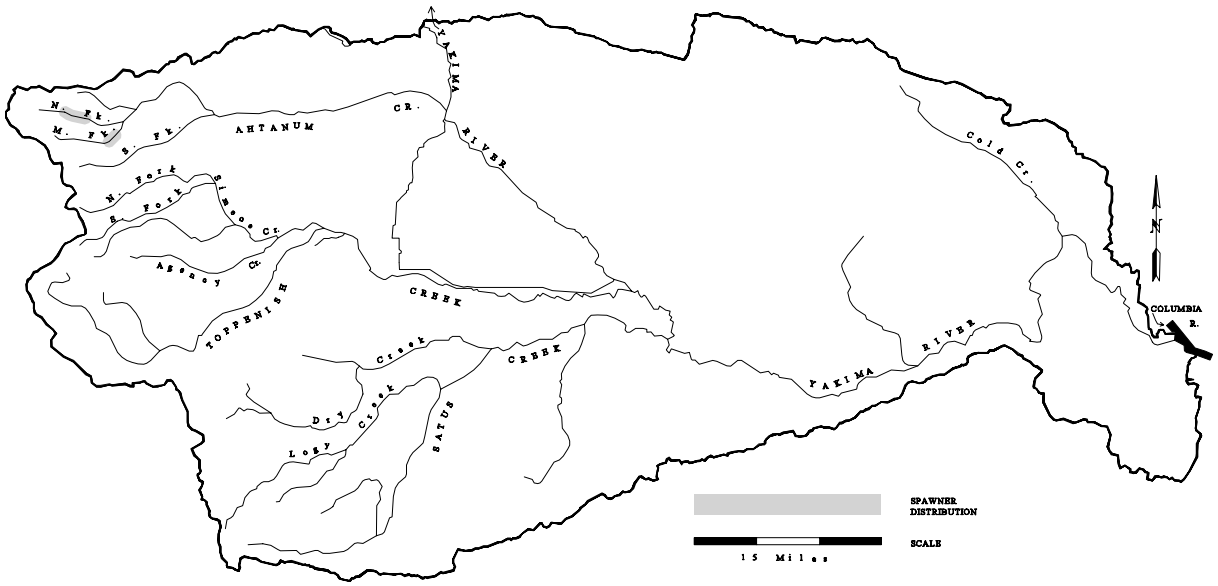
Stock status is Critical, based on chronically low spawning escapement (redd counts) in the North and Middle forks. Although additional investigations are needed to determine if bull trout/Dolly Varden spawn in the South Fork and in the mainstem, preliminary field observations and electrofishing surveys indicate extremely low population size throughout the Ahtanum drainage. Data quality is good.

It is estimated that the redd counts in the North Fork represent 75% of the spawning population for that stream. When viewed on a larger scale, it is roughly estimated that the redd counts in the North Fork represent 25% to 35% of the spawning population for the entire Ahtanum drainage. The low redd counts are not indicative of the available spawning habitat.

STOCK DEFINITION PROFILE for Ahtanum Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawning									■				Unknown

BIOLOGICAL CHARACTERISTICS

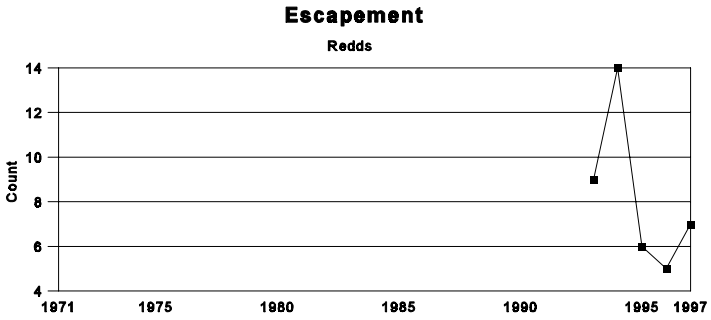
DISTINCT? - Unknown

STOCK STATUS PROFILE for Ahtanum Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93	9			
94	14			
95	6			
96	5	1		
97	7	1		



Column 1: NF Ahtanum Creek redd counts.
Column 2: MF Ahtanum Creek redd counts.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

FACTORS AFFECTING PRODUCTION

Habitat--Agricultural irrigation from mid- to low elevations causes total dewatering of the mainstem below RM 19.7 during the summer and fall. In Ahtanum Creek poor water quality, excessive sediment loading, and high water temperatures caused by overgrazing, intensive agricultural use along shorelines, development along the shoreline and in the floodplain, excessive timber harvests in the upper basin, and excessive road densities affect bull trout/Dolly Varden production. These conditions destroy bull trout/Dolly Varden habitat in the spawning areas by reducing overhead cover, increasing the amount of sediment covering spawning gravels and by creating stressful conditions (elevated water temperatures) for spawning and rearing fish. In the upper forested portion of the drainage (North, Middle and South forks) some shoreline development occurs, but sedimentation and reduced vegetative cover from cattle grazing, logging and associated road networks in close proximity to riparian areas are the primary concerns. Direct impacts by cattle trampling redds occurs on Department of Natural Resources lands in the North and Middle Forks. Excessive off-road vehicle use within riparian corridors occurs in some areas. In the North Fork Ahtanum Creek, an unscreened irrigation diversion still exists at the John-Cox Ditch and may strand bull trout/Dolly Varden adults and juveniles. This diversion is scheduled for a new screen in 1998. Fortunately, other major irrigation diversions have been screened. Although land-use practices are degrading habitat at an alarming rate, good bull trout/Dolly Varden habitat still exists in the upper portions of the Ahtanum drainage.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1986 with a one-fish catch limit and an eight-inch minimum size limit in streams. Additionally, fishing for bull trout/Dolly Varden was prohibited from August 15 to September 30 to protect spawning fish. In 1992 fishing for bull trout/Dolly Varden in the Ahtanum Creek drainage was prohibited. Beginning in 1998 there is a total fishing season closure on sections of North Fork Antanum Creek and Shellneck Creek to protect spawning and early-rearing bull trout.

Very little historical harvest information exists for bull trout/Dolly Varden. They have been observed during creel checks, but probably have been targeted by few anglers, since they are not a highly regarded game fish. Although angling impacts and harvest are not known, they may have been significant, especially during the 1960s, 1970s and early 1980s when catchable-size rainbow trout were stocked in the Ahtanum Creek mainstem and tributaries. Stocking probably occurred before 1960 as well, but these earlier records are not readily available. Hatchery rainbow trout stocking increased angling effort and harvest which probably increased the incidental catch of bull trout/Dolly Varden. Despite restrictive fishing regulations for bull trout/Dolly Varden, the continued use of bait in the Ahtanum Creek drainage by anglers fishing for rainbow and cutthroat trout increases the hooking mortality of incidentally caught and released bull trout/Dolly Varden. The combination of hatchery-stocked rainbow, large catch limits, the use of bait and easy public access to the mainstem and tributary streams generated

high angling pressure that probably had negative impacts on the wild bull trout/Dolly Varden stock. However, beginning in 1998 the use of bait and barbed treble hooks is prohibited in the North and Middle Forks of Antanum Creek, thereby reducing the mortality rate of released bull trout.

Hatchery--Catchable-size hatchery rainbow trout were stocked annually into the North and South Forks of Ahtanum Creek (above RM 19.7) throughout the 1960s, 1970s and early 1980s. It is not known what affect this stocking had on bull trout/Dolly Varden, but it is likely that they were negatively impacted. Impacts to bull trout/Dolly Varden probably included competition for food and space, predation on juvenile bull trout/Dolly Varden by rainbow trout, and increased harvest by anglers (including the increased incidental catch of bull trout/Dolly Varden). The rainbow trout stocking program was eliminated in the Ahtanum creek tributaries in the early 1980s to avoid potential impacts to native fish species, including bull trout/Dolly Varden.

In 1995 the Yakama Indian Nation began stocking hatchery coho into bull trout/Dolly Varden streams within the Ahtanum Creek drainage in an effort to reestablish self-sustaining populations (coho have been extinct in the Yakima basin for many years). It is not known what impacts, if any, coho will have on bull trout/Dolly Varden. Coho juveniles are known to be more aggressive than other anadromous or resident species, and there is the potential of competing with or preying on bull trout/Dolly Varden fry. Generally, in drainages colonized by anadromous salmon and steelhead the bull trout/Dolly Varden have successfully co-existed by occupying a different ecological niche. However, negative interactions can occur when hatchery fish (anadromous or otherwise) are stocked near bull trout/Dolly Varden spawning and rearing areas.

YAKIMA -- NACHES BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Naches bull trout/Dolly Varden have been identified as distinct based on their geographic distribution. Wild bull trout/Dolly Varden in the Naches River, a tributary of the Yakima River, originated from native fluvial/resident forms. Although few bull trout/Dolly Varden have been encountered in the mainstem Yakima River, they continue to persist in the Naches River drainage where habitat conditions are more favorable.

Until information is collected to determine otherwise, bull trout/Dolly Varden in the Naches River drainage will be considered as one stock with two primary life history forms, fluvial and resident. The larger fluvial fish inhabit mainstem rivers and spawn in the mainstem or in small tributaries. The smaller resident bull trout/Dolly Varden inhabit small headwater tributaries throughout their life cycle. There is probably some degree of overlap and genetic exchange between the two life history forms within the Naches drainage. For now, the Naches stock is assumed to be composed of fish that inhabit the Tieton River (below Rimrock Lake/Tieton Dam), Rattlesnake Creek, American River, Little Naches River, the Bumping River (below Bumping Lake Dam), and small tributaries of these larger streams. Small tributary streams currently inhabited by bull trout/Dolly Varden include Dog, Hindoo, Little Wildcat and North Fork Rattlesnake creeks (Rattlesnake Creek drainage), Crow Creek (Little Naches River drainage), Kettle, Timber and Union creeks (American River drainage). It is said that bull trout/Dolly Varden were present in Cowiche Creek (Naches River drainage) and Oak Creek (Tieton River drainage) in the early 1970s, but recent electrofishing surveys have not confirmed their presence. U.S. Forest Service staff recently reported capturing a single 100 mm to 125 mm bull trout/Dolly Varden in Milk Creek, a small tributary of the Naches River.

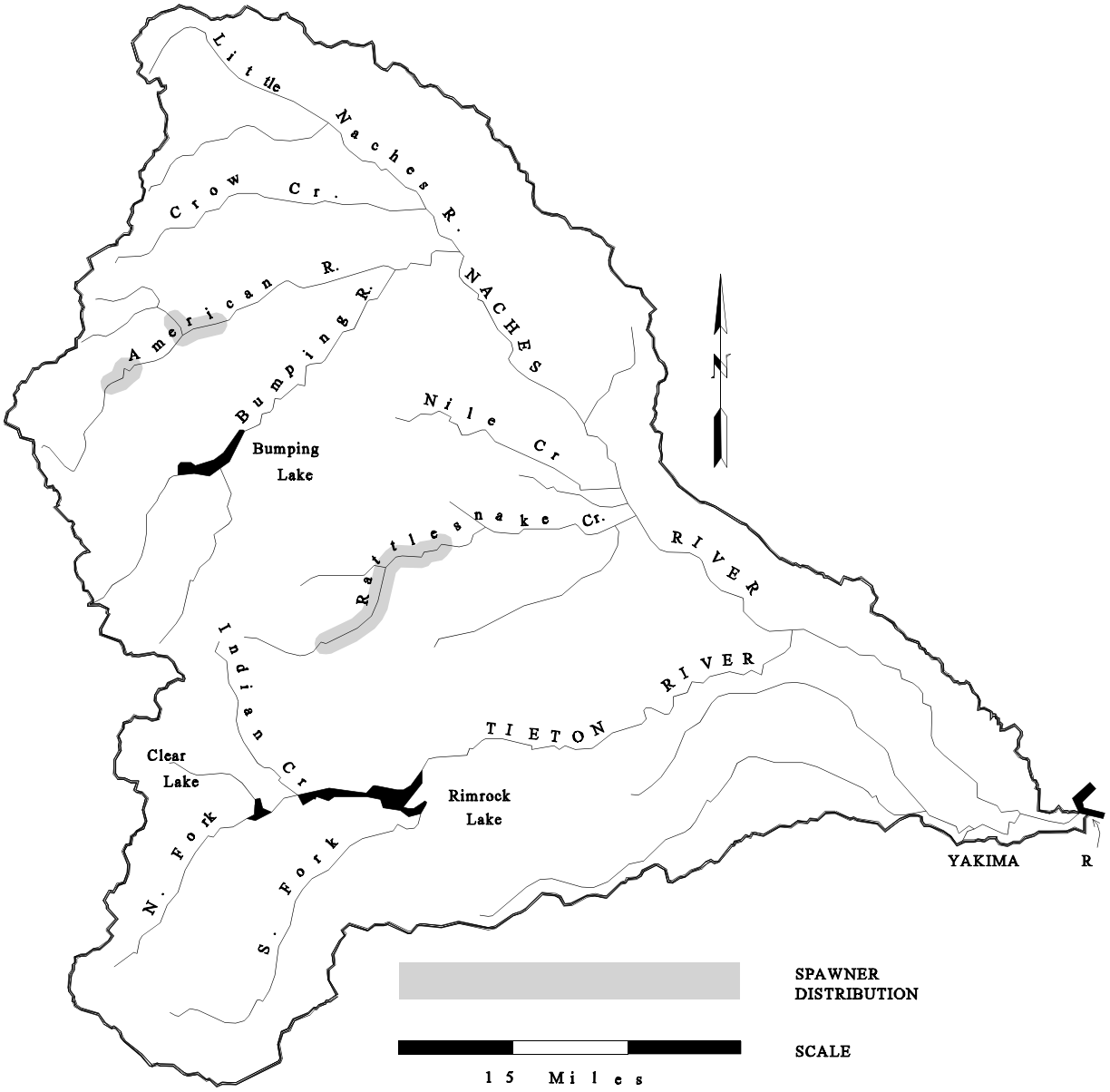
We do not know if the bull trout/Dolly Varden that inhabit the streams listed above are members of individual stocks or if they are all part of the same parent stock. It is certainly possible that some degree of genetic exchange occurs among them (there are no barriers separating any of the streams). With the exception of dams that block bull trout/Dolly Varden passage on the upper Bumping and upper Tieton rivers, bull trout/Dolly Varden are able to migrate freely within the system. Although the genetic characteristics of the stock have not been determined, bull trout/Dolly Varden in the Naches River drainage are considered distinct based on physical, geographical and thermal isolating factors.

Limited information on bull trout/Dolly Varden spawning location and spawn timing is available for Rattlesnake Creek and the American River, but no information is available

STOCK DEFINITION PROFILE for Naches Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

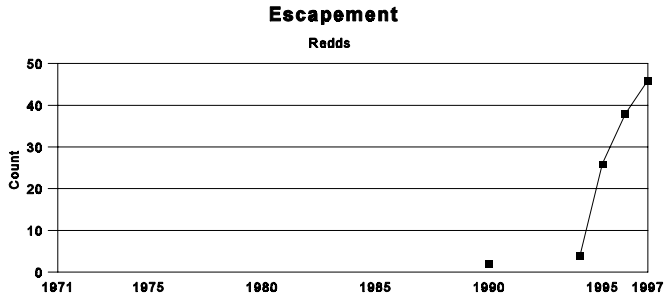
DISTINCT? - Unknown

STOCK STATUS PROFILE for Naches Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	2			
91				
92				
93				
94	4			
95	26			
96	38	25		
97	46	24		



Column 1: Rattlesnake Creek redd counts.
Column 2: American River redd counts.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

for other areas of the Naches River drainage. Most adult spawning probably occurs in September. Spawners may range in size from 200 mm to 457 mm in Rattlesnake Creek, but fish longer than 500 mm have been observed spawning in the American River. The age at maturity, sex ratio, fecundity, timing of fry emergence, and survival rates are all unknown.

STOCK STATUS

Stock status is critical, based on chronically low spawning escapement (redd counts). However, ther trend reflects increasing numbers of redds. Columns one and two of the Stock Assessment section of the Stock Status Profile show index area redd counts for Rattlesnake Creek and the American River, respectively. Within the Rattlesnake drainage, the few redds found in Dog, Hindoo and Little Wildcat creeks are included in the Rattlesnake total. The 1990 and 1994 redd counts were incomplete and should not be used as an indicator of trend. Data quality is good.

These streams should not be viewed as the only spawning area bull trout/Dolly Varden use in this large drainage. It is estimated that the redd counts represent 60% to 80% of the total spawning population for the entire Naches drainage (excluding reservoirs). The low redd counts in the American River and in Rattlesnake Creek are not indicative of the available spawning habitat.

In the last two years WDFW has been working cooperatively with the U.S. Forest Service on identifying index areas and conducting redd counts.

FACTORS AFFECTING PRODUCTION

Habitat--Dams lacking fish passage capability that were built during the early 1900s (Tieton and Bumping dams) to create large irrigation storage reservoirs in the upper Naches drainage prevented annual migrations to some upper spawning tributaries. Fortunately, sufficient spawning habitat was available in other areas of the Naches drainage. In the past, unscreened or inadequate screening on irrigation diversions in the Naches drainage stranded bull trout/Dolly Varden and other species in irrigation canals. When this stranding occurs, fish cannot return to mainstem rivers and perish shortly after entering irrigation canals or when the canals are dewatered. Until recently, the irrigation diversion at Selah/Naches contributed to high fish mortality rates in the Naches. Thanks to funds that were made available through the Northwest Power Planning Council's Fish and Wildlife Program, old screens have been replaced with new ones. Recent improvements in screen design and more stringent screening requirements have eliminated or substantially reduced fish stranding and passage problems. The last major diversion to be upgraded was the Yakima/Tieton Diversion; a new screen is now in place.

Other important habitat limiting factors contributing to decreased bull trout/Dolly Varden production include high sediment loads and turbid water conditions following (heavy rain or rapid snow-melt events or high and turbid water conditions during irrigation water releases from Rimrock Lake). Such conditions scour redds and deposit sediment on spawning gravels. Shoreline/floodplain development and diking, especially on the mainstem Naches, reduces shoreline cover and increases water temperature. Logging and road construction/maintenance activities create high sediment loads during spring runoff and rain events. They also reduce overhead cover and increase water temperature when logging occurs near streams. Road development in the Rattlesnake drainage, especially Cowpuncher Ridge Road contributes high sediment loads. Off-road vehicle (ORV) use in some areas of the Little Naches and Rattlesnake Creek is a problem (e.g., ORV's crossing or driving in the stream bed). Gold dredging in the late summer, especially in the Little Naches, is also a concern. Dredging may disrupt migration and spawning of bull trout/Dolly Varden during the late summer. An irrigation diversion in the lower Rattlesnake Creek may create a low-water barrier to bull trout/Dolly Varden migration during the late summer. Irrigation water withdrawals increase and exacerbate low flow conditions. Irrigation return flows and non-point runoff from agriculture in the lower Naches River increase sediment loading and decrease water quality.

Although all of the factors mentioned above contribute to decreased bull trout/Dolly Varden production some excellent habitat conditions are still present in the Naches drainage (e.g., American River, Rattlesnake Creek). Although development continues to expand and bull trout/Dolly Varden habitat continues to shrink, bull trout/Dolly Varden persist in areas where streams penetrate into unroaded wilderness areas, or where large riparian buffers exist or where development has not occurred.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1986 with a one-fish catch limit and an eight-inch minimum size limit in streams. Additionally, fishing for bull trout/Dolly Varden was prohibited from August 15 to September 30 to protect spawning fish. Catch-and-release regulations were implemented in 1990 on Rattlesnake Creek, and in 1992 fishing for bull trout/Dolly Varden was prohibited in the Naches River drainage. Beginning in 1998 there is a total fishing season closure on a section of Union Creek to protect spawning and early-rearing bull trout.

Although bull trout/Dolly Varden appear in catch records dating back to the 1930s, few fish were harvested relative to the catch of other species. Bull trout/Dolly Varden were probably targeted by few anglers due to their lower abundance and because they were not as highly regarded as other gamefish. Historical catch information was based on random creel checks of anglers during the fishing season. The census procedures were not standardized and were often not conducted during consecutive years (there are many years with no data). This type of catch information is useful only for showing

the presence of bull trout/Dolly Varden in a particular stream and possibly their relative abundance compared to other species.

Although angling impacts and harvest are not entirely known, they may have been significant, at least from the 1960s to the early 1990s, when catchable-size rainbow trout were stocked in the Naches drainage. Stocking probably occurred before 1960 as well, but these earlier records are not readily available. Stocking hatchery rainbow trout into bull trout/Dolly Varden streams increased angling use and harvest which probably increased the incidental catch of bull trout/Dolly Varden. Despite restrictive fishing regulations for bull trout/Dolly Varden, the continued use of bait in the Naches drainage by anglers fishing for rainbow trout increases the hooking mortality of incidentally caught and released bull trout/Dolly Varden. The combination of hatchery-stocked rainbow trout, large catch limits, the use of bait and easy public access to the mainstem and tributary streams generated high angling pressure that probably had negative impacts on the wild bull trout/Dolly Varden stock. However, beginning in 1998 the use of bait and barbed treble hooks is prohibited in the Naches, Little Naches, Bumping and American rivers (including the Ranier Fork) and in Cowiche Creek, thereby reducing the mortality rate of released bull trout.

Hatchery--Catchable-size hatchery rainbow trout were stocked annually into the Naches River drainage for at least the past 30 years. We do not know what effect this stocking had on bull trout/Dolly Varden, but it is likely that they were negatively impacted. Impacts to bull trout/Dolly Varden probably included competition for food and space, predation on bull trout/Dolly Varden juveniles, and increased angler harvest rates, including increased incidental catch of bull trout/Dolly Varden. The rainbow trout stocking program was eliminated in the Naches River and other large tributaries (except the Tieton River) in the early 1990s to avoid potential impacts to native fish species, including bull trout/Dolly Varden.

Non-native brook trout were historically planted in the Naches River drainage, and now there are self-sustaining populations in a few areas. Potential bull trout/Dolly Varden hybridization with brook trout, particularly in the American River, is a concern.

In 1995 the Yakama Indian Nation began stocking hatchery coho into various bull trout/Dolly Varden streams within the Naches River drainage in an effort to reestablish self-sustaining populations (coho have been extinct in the Yakima basin for many years). It is not known what impacts, if any, coho will have on bull trout/Dolly Varden. Coho juveniles are known to be more aggressive than other anadromous or resident species, and there is the potential of competing with or preying on bull trout/Dolly Varden fry. Generally, in drainages colonized by anadromous salmon and steelhead the bull trout/Dolly Varden have successfully co-existed by occupying a different niche. However, negative interactions can occur when hatchery fish (anadromous or otherwise) are stocked near bull trout/Dolly Varden spawning and rearing areas.

YAKIMA -- RIMROCK LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Rimrock Lake bull trout have been identified as a distinct stock based on their geographic distribution. They originated from native fluvial/resident life history forms that occurred in the Tieton River, a tributary of the Naches River. Although the genetic characteristics of the stock have not been determined, Rimrock Lake bull trout/Dolly Varden are considered distinct based on their physical and geographical isolation of spawning adults above Tieton Dam. After construction of the dam in 1925, the resulting isolated population exhibited an adfluvial life history.

There are a few references (mostly old catch records) that indicate the presence of bull trout/Dolly Varden in other parts of the Rimrock Lake drainage including Clear Lake and Dog Lake. Historical catch information shows only one bull trout/Dolly Varden was caught in Dog Lake. This was likely a misidentified eastern brook trout. At Clear Lake, bull trout/Dolly Varden were recorded in the catch of anglers throughout the 1950s, but few have been caught since then. Some of these records date back to the 1930s. However, in 1993 U.S. Forest Service staff reported capturing one 75 mm to 100 mm bull trout/Dolly Varden from a minnow trap in Clear Lake, and in 1996 biologists from Central Washington University observed an adult bull trout in the upper North Fork Tieton River (a tributary of Clear Lake) (Paul James, Central Washington University, personal communication).

Adult spawning occurs in two drainages of Rimrock Lake, Indian Creek and the South Fork Tieton River. Bull trout/Dolly Varden also spawn in Bear Creek, a tributary of the South Fork Tieton (redds observed in Bear Creek are included in the redd count for the South Fork). Juvenile bull trout/Dolly Varden have been observed in several other South Fork Tieton tributaries including Short and Dirty Creek, Grey Creek, Spruce Creek and Corral Creek. Although bull trout/Dolly Varden are present in the North Fork Tieton River below Clear Lake Dam, spawning activity has not been observed there. Spawning occurs from late August to early October although bull trout/Dolly Varden begin to stage in the South Fork Tieton as early as July.

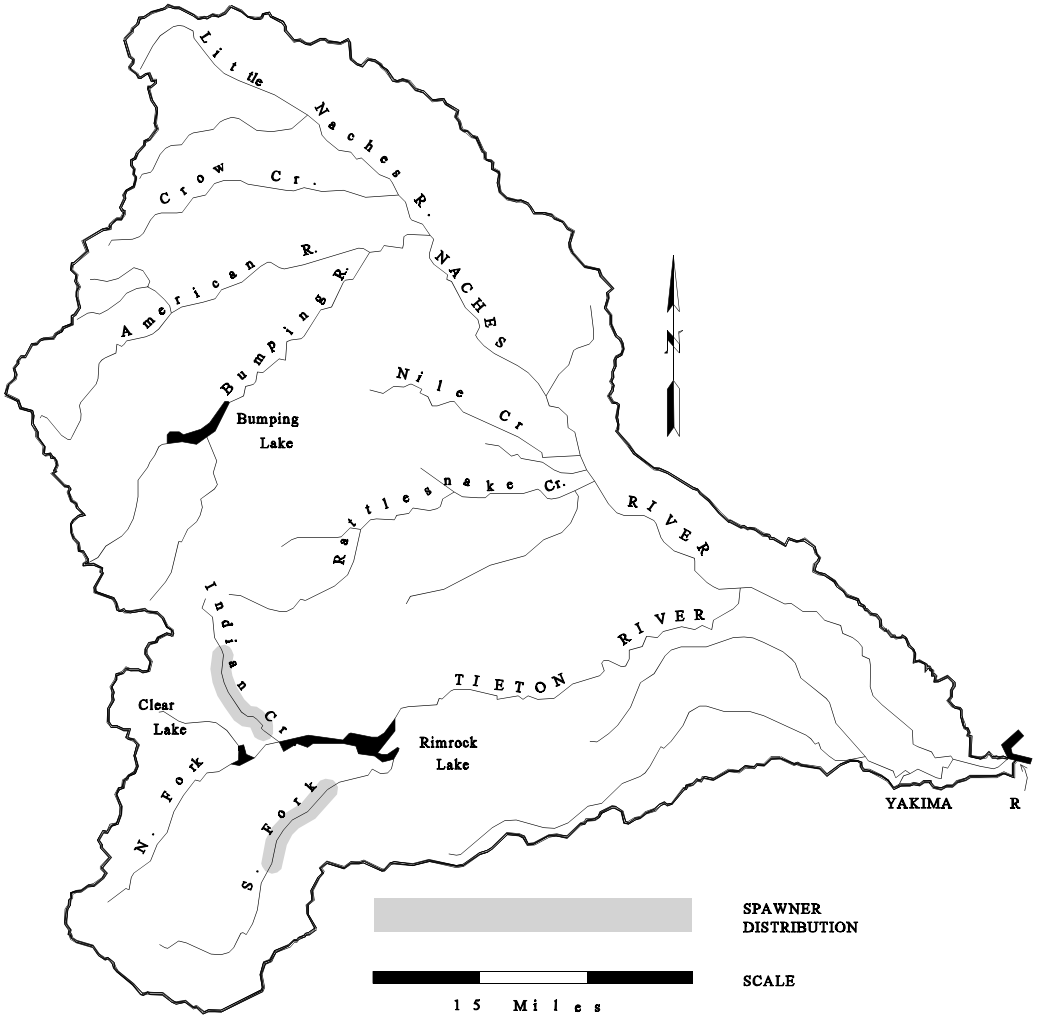
The majority of adult spawners range from 457 mm to 610 mm in total length. However, fish from 200 mm to 800 mm have been observed during spawning surveys and trap monitoring. The age at maturity is unknown, but first time spawners are probably 5+ years. Sex ratio and fecundity are unknown.

Although the timing of fry emergence has not been specifically determined, it probably occurs in March as reported in the literature for other populations. Survival rates are

STOCK DEFINITION PROFILE for Rimrock Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Adfluvial Riv Entry							■	■	■				Yes
Spawning								■	■	■			No

Adfluvial river entry for Indian Creek is mid-August to mid-September. Adfluvial river entry is Distinct for South Fork Tieton, not Indian Creek. Spawn timing is the same for both.

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

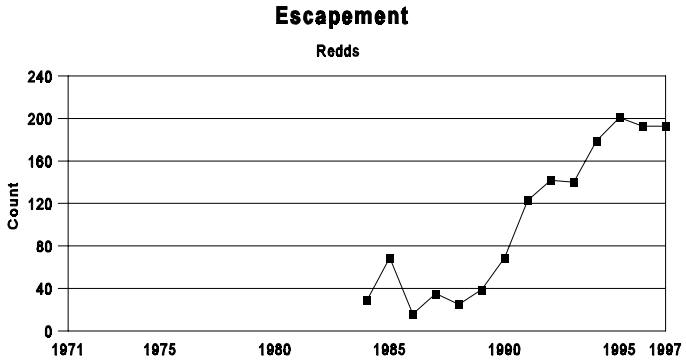
STOCK STATUS PROFILE for Rimrock Lake Bull Trout/Dolly Varden

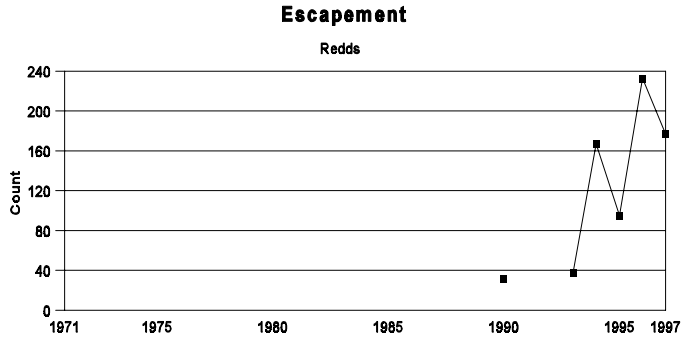
STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	29			
85	69			
86	16			
87	35			
88	25			
89	39			
90	69	32		
91	123			
92	142			
93	140	38		
94	179	167		
95	201	95		
96	193	233		
97	193	177		

Column 1: Indian Creek counts.
Column 2: South Fork Tieton River counts.





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

unknown. Rearing juveniles probably spend several years in tributary streams before migrating to Rimrock Lake.

STOCK STATUS

The status of the stock is Healthy based on increasing trends in spawning escapement (redd counts). Columns one and two of the Stock Assessment section of the Stock Status Profile show redd counts for Indian Creek and the South Fork Tieton River, respectively. The counts in Indian Creek in 1984 through 1987 and in the South Fork Tieton in 1990 were incomplete and should not be used as indicators of trends. Otherwise, data quality is excellent. In Indian Creek, redd counts have increased from a low of 25 redds in 1988 to over 200 in 1995. Redd counts began in 1990 in the South Fork Tieton River and although they have fluctuated more than those in Indian Creek, there is a definite upward trend in the number of redds.

It is estimated that the redd counts in the Rimrock Lake drainage represent more than 98% of the total spawning population. The redd counts are not indicative of the available spawning habitat.

Since 1995 WDFW has been working cooperatively with the U.S. Bureau of Reclamation and Central Washington University on monitoring and research of the Rimrock Lake bull trout/Dolly Varden stock. Based upon initial indications of run timing and tagging work, it appears that the Indian Creek and South Fork Tieton fish may be two distinct spawning populations. Ongoing data collection on the population dynamics and life history attributes of these two stocks will be valuable for addressing stock identification issues and management plans in the future.

FACTORS AFFECTING PRODUCTION

Habitat--In the South Fork Tieton River, cattle grazing and jeep/off-road vehicle use destroy riparian vegetation and erode stream banks increasing sediment loads in spawning areas. Cattle also cause direct impacts by trampling redds on U.S. Forest Service lands in the South Fork Tieton. In Indian Creek, low flows during the spawning period may limit spawner access in some areas and high winter/spring runoff shifts the stream bedload and controls channel complexity. Although these conditions may ultimately affect bull trout/Dolly Varden production in Indian Creek, at least for now it appears that the fish have adapted well enough to increase their population abundance (annual redd counts have increased every year since 1988). Favorable habitat conditions including clean cold spring water with good overhead cover and in-stream woody debris are primary elements that have enabled increased production in Indian Creek. We do not know what effect large irrigation water releases from Rimrock Lake during the summer/fall may have on the stock.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1984 with a one-fish catch limit and 20-inch minimum size limit for fish caught in the lake and six inches for fish caught in tributary streams. In 1986 the minimum length was increased to eight inches in streams, and fishing for bull trout/Dolly Varden in lakes and streams was closed from August 15 to September 30 to protect spawning fish. Beginning in 1992 fishing for bull trout/Dolly Varden was prohibited in the Rimrock Lake drainage. In addition, there have been total fishing season closures on Indian Creek and a section of the South Fork Tieton River since 1990 and 1995, respectively to protect spawning and rearing bull trout/Dolly Varden. Beginning in 1998 a section of Bear Creek (a tributary to the South Fork) is included in the total fishing season closure. It appears that increases in escapement over the past eight years have been a direct result of restrictive fishing regulations.

Although bull trout/Dolly Varden appear in the catch records dating back to the 1930s, few fish were harvested relative to other species. Bull trout/Dolly Varden were probably targeted by few anglers due to their lower abundance and because they were not as highly regarded as other gamefish. Historical catch information was based on random creel checks of anglers during the fishing season. The census procedures were not standardized and were often not conducted during consecutive years (there are many years with no data). This type of catch information is useful only for showing the presence of bull trout/Dolly Varden in a particular lake or stream and possibly their relative abundance compared to other species.

Although angling impacts and harvest are not entirely known, they may have been significant in some areas of the drainage. The South Fork and North Fork Tieton rivers have been stocked with catchable-size rainbow trout at least since the early 1960's. Stocking probably occurred before 1960 as well, but these earlier records are not readily available. Stocking hatchery rainbow trout into bull trout/Dolly Varden streams increased angling use and harvest which probably increased the incidental catch of bull trout/Dolly Varden. Despite restrictive fishing regulations for bull trout/Dolly Varden, the continued use of bait in these rivers by anglers fishing for hatchery rainbow trout increases the hooking mortality of incidentally caught and released bull trout/Dolly Varden. The combination of stocked hatchery rainbow, large catch limits, the use of bait and easy public access to these rivers generated high angling pressure that probably had negative impacts to the wild bull trout/Dolly Varden stock.

Poaching has been a problem in some areas, particularly in the South Fork Tieton River. The combination of easy public access to the spawning grounds and the early migration of adult spawners into the river during the high summer recreational-use period compounds the problem. However, a recent fishing season closure on the spawning grounds, posting bull trout/Dolly Varden information signs in the area, and increased enforcement patrols are reducing the incidence of poaching.

Hatchery--Catchable-size hatchery rainbow trout were stocked annually into the South Fork and North Fork Tieton rivers for at least the past 30 years. We do not know what effect this stocking had on bull trout/Dolly Varden, but it is likely that they were negatively impacted. Impacts to bull trout/Dolly Varden probably included in the form of competition for food and space, predation on bull trout/Dolly Varden juveniles, and increased angler harvest rates of spawning adults. The rainbow trout stocking program in these streams was eliminated in the early 1990's to avoid potential impacts to native fish species in spawning and rearing areas. Although rainbow trout fry are stocked into Rimrock Lake to provide increased angling opportunity, it does not appear that this stocking program is impacting bull trout/Dolly Varden. Rainbows have not been observed moving into bull trout/Dolly Varden spawning areas (thus species interactions appear to be nil) and although bull trout/Dolly Varden are occasionally caught in the lake by anglers fishing for kokanee or rainbows, they are infrequently encountered. During most of the year bull trout/Dolly Varden reside in the reservoir and are not subjected to the intense angling pressure that can occur when they are concentrated in the spawning areas of streams.

Non-native brook trout were stocked in the Rimrock Lake drainage in the past, but stocking was eliminated due to concerns over hybridization with bull trout/Dolly Varden. However, naturally-reproducing brook trout populations still persist in some areas of the drainage. Although a few brook trout have been observed in Indian Creek, and one bull/brook hybrid was captured in October, 1994 in a trap at the mouth of Indian Creek (hybridization was confirmed through genetic analysis), widespread hybridization does not appear to have occurred in the drainage.

YAKIMA -- BUMPING LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bumping Lake bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. They may have originated from a native adfluvial life history form even before the construction of a dam on the Bumping River, a tributary of the Naches River. Fluvial/resident forms may have been present as well since they currently inhabit streams in the drainage below Bumping Lake Dam. Regardless, construction of the dam in 1910 enlarged the natural lake and relegated the bull trout/Dolly Varden stock to an adfluvial life history. The genetic characteristics of the stock have not been determined, Bumping Lake bull trout/Dolly Varden are considered distinct based on physical and geographical isolation of spawning adults above Bumping Lake Dam.

Deep Creek appears to be the only tributary of Bumping Lake where bull trout/Dolly Varden spawn. Spawning occurs from late August to mid-September.

The majority of adult spawners range from 457 mm to 610 mm in total length, although larger fish have been observed during spawning surveys. The age at maturity is unknown, but first time spawners are probably 5+ years. Sex ratio and fecundity are also unknown.

Although the timing of fry emergence has not been specifically determined, it probably occurs in March. Survival rates are unknown. Rearing juveniles probably spend several years in Deep Creek before migrating to Bumping Lake.

STOCK STATUS

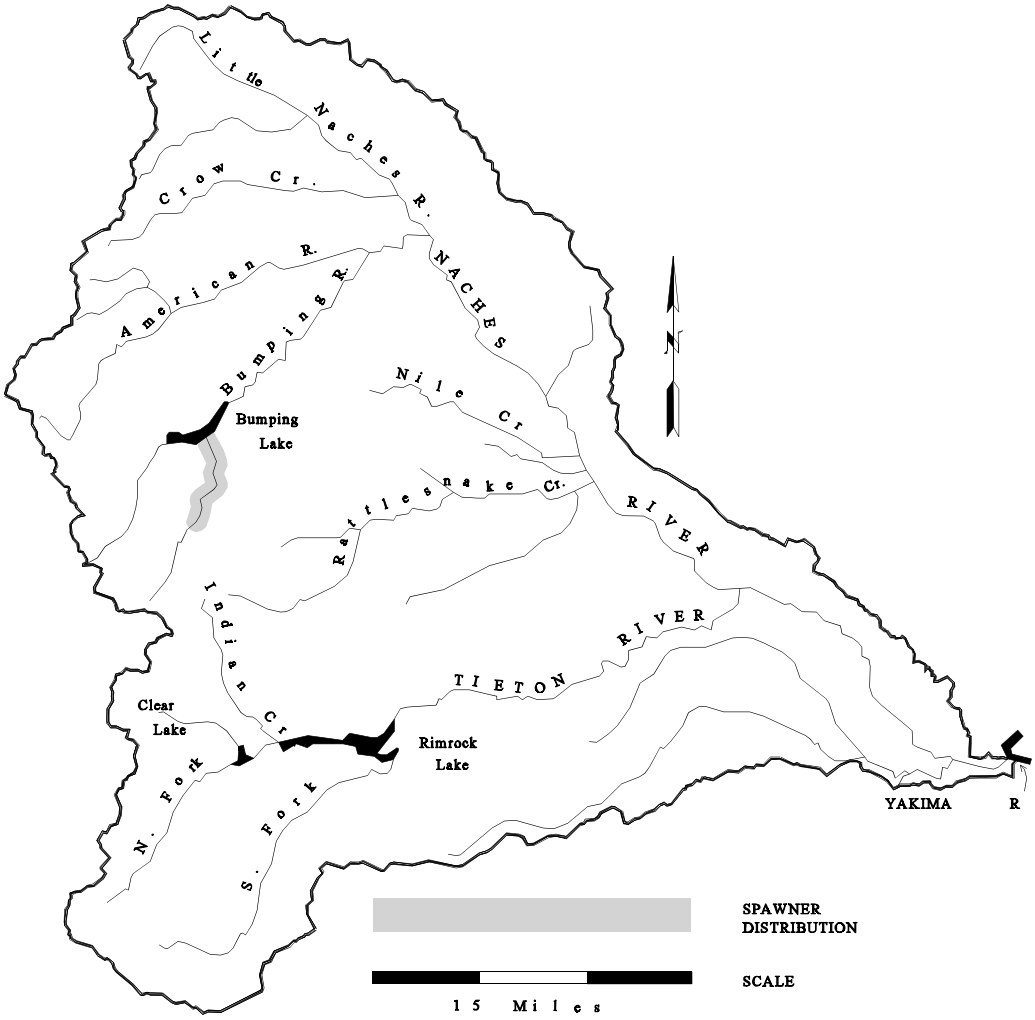
The status of the stock is Depressed based on short-term severe declines in spawning escapement (redd counts) in 1993, 1994 and 1996. Redd counts conducted in 1989 and 1990 were incomplete and should not be used as an indicator of trend. Otherwise, data quality is excellent. The severe declines in redd counts (1993, 1994, 1996) appear to be related to local drought conditions during the spawning period which caused sections of the stream to dry up, thus prohibiting access by migrating adults. Weak year-class strength may also be a factor.

In 1997 WDFW began working with the U.S. Bureau of Reclamation and Central Washington University on monitoring and research of the Bumping Lake bull trout/Dolly Varden stock. Trapping/tagging studies of adult spawners migrating into Deep Creek will increase our knowledge of population dynamics and life history attributes.

STOCK DEFINITION PROFILE for Bumping Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Adfluvial Riv Entry									■				No
Adfluvial Spawning									■				No

BIOLOGICAL CHARACTERISTICS

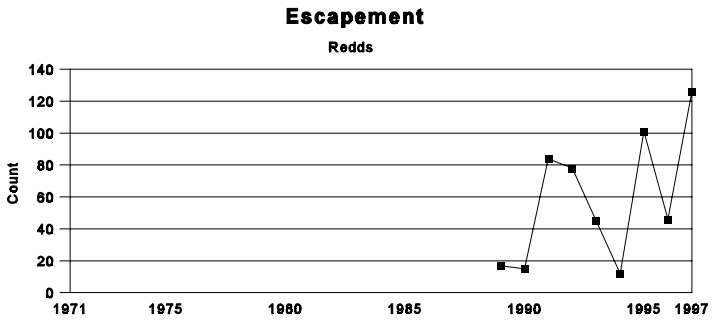
DISTINCT? - Unknown

STOCK STATUS PROFILE for Bumping Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	17			
90	15			
91	84			
92	78			
93	45			
94	12			
95	101			
96	46			
97	126			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Depressed

Screening Criteria
Short-term severe decline

It is estimated that the redd counts in the Bumping Lake drainage represent more than 98% of the total spawning population. The redd counts are not indicative of the available spawning habitat.

FACTORS AFFECTING PRODUCTION

Habitat--The principal factors limiting bull trout/Dolly Varden production within the Bumping Lake drainage are caused by low flows during the spawning period which limits access to spawning areas and strands rearing juveniles in dry channel beds. It is not known what effect large irrigation water releases from Bumping Lake may have on the stock. Habitat quality is very good in the lake and in the spawning areas. Habitat conditions include clean, cold spring water with excellent overhead cover and in-stream woody debris.

In 1950 Bumping Lake was treated with rotenone to kill squawfish and suckers. This also killed a variety of other fish species, including bull trout/Dolly Varden. Obviously bull trout/Dolly Varden were able to recolonize the lake in subsequent years, but it was probably a slow rebuilding process.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1984 with a one-fish catch limit and 20-inch minimum size limit for fish caught in the lake and six inches for fish caught in tributary streams. In 1986 the minimum size limit was increased to eight inches in streams, and fishing for bull trout/Dolly Varden in lakes and streams was closed from August 15 to September 30 to protect spawning fish. Beginning in 1992 fishing for bull trout/Dolly Varden was prohibited in the Bumping Lake drainage. In addition, there has been a total fishing season closure in a section of Deep Creek since 1995 to protect spawning and rearing bull trout/Dolly Varden.

Although bull trout/Dolly Varden appear in the catch records dating back to the 1940's, few fish were harvested relative to the catch of other species. Bull trout/Dolly Varden were probably targeted by few anglers due to their lower abundance and because they were not as highly regarded as other gamefish. Historical catch information was based on random creel checks of anglers during the fishing season. The census procedures were not standardized and were often not conducted during consecutive years (there are many years with no data). This type of catch information is useful only for showing the presence of bull trout/Dolly Varden in a particular lake or stream and possibly their relative abundance compared to other species.

Although angling impacts and harvest are not known, they may have been significant in some areas of the drainage, particularly in Deep Creek. Large adfluvial spawning bull trout/Dolly Varden were easily harvested from this spawning tributary prior to the implementation of restrictive fishing regulations in the mid-1980s. Poaching has also been a problem in Deep Creek. Easy public access to the spawning grounds of bull trout/Dolly Varden compounds the problem. However, a recent fishing season closure

on the spawning grounds, posting bull trout/Dolly Varden information signs in the area and increased enforcement patrols are reducing the incidence of poaching.

Hatchery--Hatchery rainbow trout have been stocked into Bumping Lake for at least the past 25 years. Although catchable-size rainbows are no longer stocked in the lake, rainbow fry continue to be stocked. This stocking program is intended to increase angling opportunity and trout catch rates. It does not appear that stocking rainbow trout fry is negatively impacting bull trout/Dolly Varden as is often the case when catchable-size hatchery rainbows are stocked into bull trout/Dolly Varden streams (e.g., negative impacts to bull trout/Dolly Varden include competition for food and space, predation of juvenile bull trout/Dolly Varden by rainbow and increased harvest of spawning adults). Rainbows have not been observed moving into bull trout/Dolly Varden spawning areas (thus species interactions appear to be nil) and although bull trout/Dolly Varden are occasionally caught in the lake by anglers fishing for kokanee or rainbows, they are infrequently encountered.

Non-native brook trout were stocked in the Bumping Lake drainage in the past, but stocking was eliminated due to concerns over hybridization with bull trout/Dolly Varden. Although naturally-reproducing brook trout populations still persist in some areas of the drainage, they do not appear to be causing negative impacts to the bull trout/Dolly Varden stock (hybridization has not been observed). This may be due to the low number of brook trout that occur in bull trout/Dolly Varden spawning areas.

YAKIMA -- NORTH FORK TEANAWAY BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

North Fork Teanaway bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Very little is known about the bull trout/Dolly Varden stock in the North Fork Teanaway River, a tributary of the Teanaway and upper Yakima rivers. However, bull trout/Dolly Varden appear to be more abundant in the North Fork than in other upper Yakima River tributaries. Although the genetic characteristics of the stock have not been determined, this fluvial/resident stock is considered distinct based on the geographic distribution. Isolating factors in the lower Teanaway River including low flows and dewatering caused by irrigation diversions may preclude adult spawning migrations from the Yakima River during some years.. Although the habitat appears to be suitable for bull trout/Dolly Varden in the West and Middle forks, no bull trout/Dolly Varden have been found in these streams. Bull trout/Dolly Varden have been observed only in the North Fork Teanaway and small tributary streams (i.e., Jungle, Jack, and DeRoux creeks). Most adult spawning probably occurs in September. Mature fish may range in size from 225 mm to 530 mm. The age at maturity, sex ratio and fecundity, timing of fry emergence and survival rates are all unknown.

North Fork Teanaway bull trout/Dolly Varden are native and are maintained by wild production.

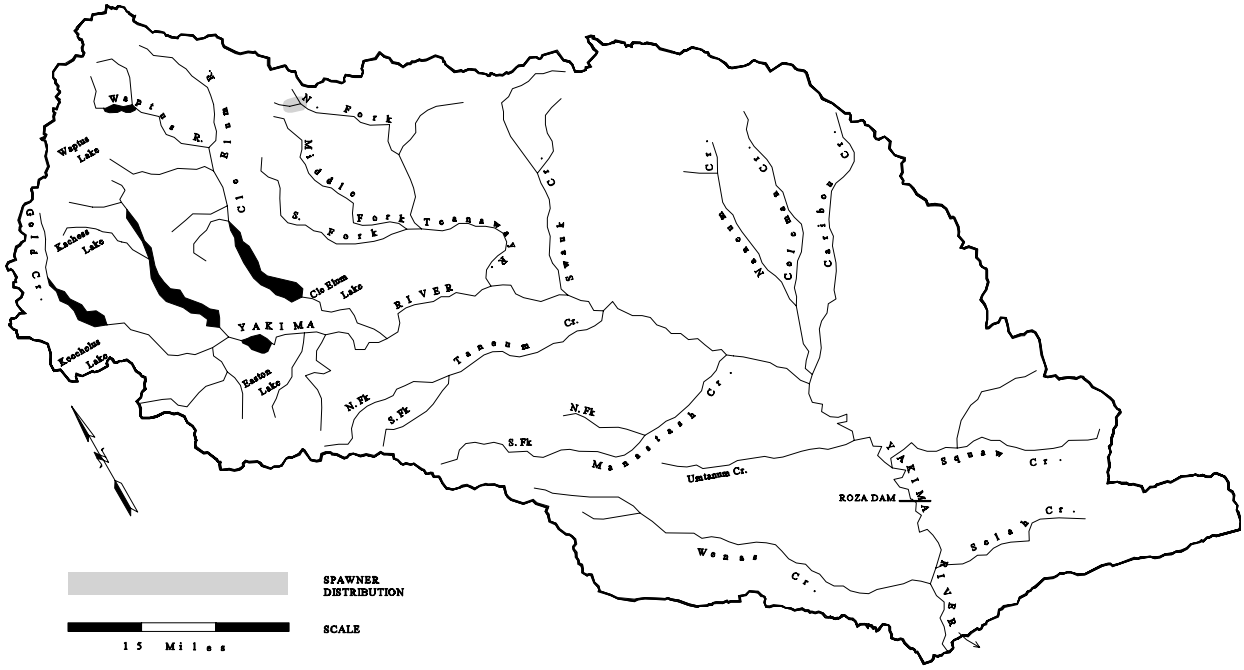
STOCK STATUS

The status of the stock is Critical based on chronically low numbers of fish observed in index areas, traps and low redd counts. WDFW staff collected bull trout/Dolly Varden information from traps during 1991 to 1994 and Index Count information with electrofishing equipment from 1990 to 1996. Spawning surveys began in 1996. Data quality is good. Only two redds were observed in DeRoux Creek (a small tributary of the North Fork). Most fish observed in index and trap counts ranged in size from 100 mm to 254 mm in total length. Index counts were based on electrofishing surveys conducted from July through in September in three 100-meter sections. Index-trap monitoring occurred during April/May at one site. The trap was operated in 1995 and 1996. Population estimates for the entire North Fork indicated a total of 54 bull trout in 1994 and a total of 10 bull trout in 1997. These estimates were based on snorkel surveys and include all size or age classes, juvenile through adult (mainstem North Fork only).

STOCK DEFINITION PROFILE for North Fork Teanaway Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
								■				Unknown

BIOLOGICAL CHARACTERISTICS

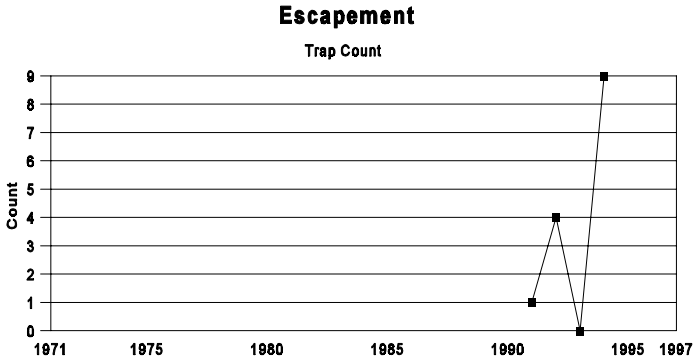
DISTINCT? - Unknown

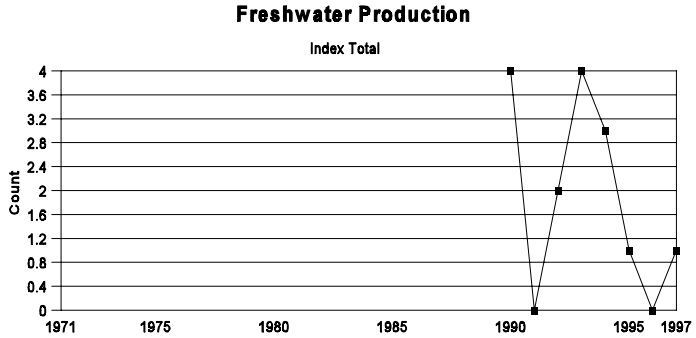
STOCK STATUS PROFILE for North Fork Teanaway Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Trap count	FW PROD Index Total	ESCAPE Redds	FW PROD Pop. est.
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90		4		
91	1	0		
92	4	2		
93	0	4		
94	9	3		54
95		1		
96		0	2	
97		1	0	10





AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

FACTORS AFFECTING PRODUCTION

Habitat--In the past, unscreened irrigation diversions were a major problem in the Teanaway drainage because they created conditions that stranded bull trout/Dolly Varden and other species in irrigation canals. When this occurs fish cannot return to mainstem rivers and perish shortly after entering the canals or when the canals are dewatered. Although irrigation diversions are now screened in the North Fork Teanaway, some of the screens are inefficient at bypassing juvenile fish due to inadequate mesh size and poor approach velocities. However, there are plans to correct these deficiencies and upgrade the screens to current screening standards in the near future. Low water flows also affect the Teanaway River. Irrigation diversions create extreme low flows or dry channels, particularly in the lower river. Such conditions impede or prevent fish migration within the system. Timber harvests in or near riparian corridors in the upper watershed combined with excessive road densities contribute greatly to increased water temperatures, sediment loads and poor water quality in all downstream areas. Increased sediment loading smothers eggs or retards their development in the redds, reduces juvenile growth and elevates water temperatures causing stressful conditions for coldwater fish such as bull trout/Dolly Varden.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1986 with a one-fish catch limit and an eight-inch minimum size limit in streams. Additionally, fishing for bull trout/Dolly Varden was prohibited from August 15 to September 30 to protect spawning fish. In 1992 fishing for bull trout/Dolly Varden was prohibited in the Teanaway drainage.

Very little catch information exists for the Teanaway drainage, and few of the random creel checks conducted in the area identified bull trout/Dolly Varden in the catch. Hatchery rainbow trout were the predominant species recorded from angler creel checks. Although angling impacts and harvest are not known, they may have been significant, especially during the mid 1970s to early 1990s when catchable-size rainbow trout were stocked in the North Fork Teanaway River. Hatchery rainbow trout stocking increased angling opportunity and harvest which probably increased the incidental catch of bull trout/Dolly Varden. Despite restrictive fishing regulations for bull trout/Dolly Varden, the continued use of bait in the Teanaway drainage by anglers fishing for rainbow trout probably increases the hooking mortality of incidentally caught and released bull trout/Dolly Varden. However, beginning in 1998 the use of bait and barbed treble hooks were prohibited in the North Fork and in DeRoux Creek, thereby reducing the mortality rate of released bull trout.

Hatchery--Rainbow trout have been periodically stocked in the North Fork Teanaway since the early 1930s. For the most part, rainbow trout fry were stocked until the mid-1970s, then stocking was switched to catchable-size rainbow. It is not known what

effect this stocking had on bull trout/Dolly Varden, but it is likely that they were negatively impacted. Impacts to bull trout/Dolly Varden probably included competition for food and space, predation on juvenile bull trout/Dolly Varden by rainbow, and increased harvest rates of trout by anglers (including the increased incidental catch of bull trout/Dolly Varden). The rainbow trout stocking program was eliminated in the Teanaway tributaries in the early 1990s to avoid potential impacts to native fish species, including bull trout/Dolly Varden.

Currently, there are plans to supplement spring chinook populations in the Yakima River subbasin. Hatchery facilities will be built and an acclimation pond for spring chinook will be constructed in the North Fork Teanaway River. Biologists responsible for managing the facility believe that spring chinook will not impact the local bull trout/Dolly Varden stock because the acclimation facility will be constructed downstream of bull trout/Dolly Varden headwater areas. Furthermore, it is assumed that returning spring chinook adults and their progeny will not encroach into bull trout/Dolly Varden areas and that temporal and spatial segregation will occur, even though bull trout/Dolly Varden have been captured in traps near the acclimation site.

Historically, bull trout/Dolly Varden and chinook salmon occurred together in many areas of the basin. Bull trout/Dolly Varden probably benefited from the presence of anadromous salmonids such as spring chinook. The downstream drift of eggs released from spawning salmon provided food for bull trout/Dolly Varden and other resident fishes, but more importantly the presence of decaying salmon carcasses greatly benefitted juvenile salmon and resident fishes by recycling nutrients. Generally, in drainages colonized by wild anadromous salmon and steelhead, bull trout/Dolly Varden have successfully co-existed by occupying a slightly different ecological niche.

However, in many areas where bull trout/Dolly Varden exist, habitat conditions have deteriorated, and natural predator/prey balances have been upset. Bull trout/Dolly Varden populations are at or near critically low levels in many areas of the basin. Concern exists over acclimating or stocking large numbers of hatchery fish into bull trout/Dolly Varden streams that are already being impacted by unfavorable habitat conditions. Great care should be taken to avoid actions that will push bull trout/Dolly Varden to extinction.

YAKIMA -- CLE ELUM/WAPTUS LAKES BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Cle Elum Lake/Waptus Lakes bull trout/Dolly Varden are considered distinct based on their physical and geographical isolation above Cle Elum Lake Dam. They may have originated from a native adfluvial life history form even before the construction of a dam on the Cle Elum River, a tributary of the upper Yakima River. Fluvial forms may have been present in the area as well, although currently very few are encountered in the mainstem Yakima River below the Cle Elum drainage. Regardless, construction of the dam in 1931 enlarged the natural lake and relegated the bull trout/Dolly Varden stock to an adfluvial life history.

Old catch records indicate that bull trout/Dolly Varden were present in Waptus Lake (which lies in the headwaters of the Cle Elum drainage) in the 1940s and early 1950s, but no catch data have been collected since then. WDFW biologists only recently confirmed the presence of bull trout in Waptus Lake by capturing a single 190 mm fish from a gill net in 1996 and a 470 mm fish by hook and line in 1997. Surveys to identify spawning locations have been unsuccessful so far. It is not known what relationship, if any, there is between bull trout/Dolly Varden inhabiting Waptus and Cle Elum lakes. A falls located on the lower Waptus River between Waptus and Cle Elum Lakes may serve as an effective barrier to bull trout/Dolly Varden migration between the two systems. Until additional investigations can be conducted to address the question, Cle Elum and Waptus lakes will be considered together.

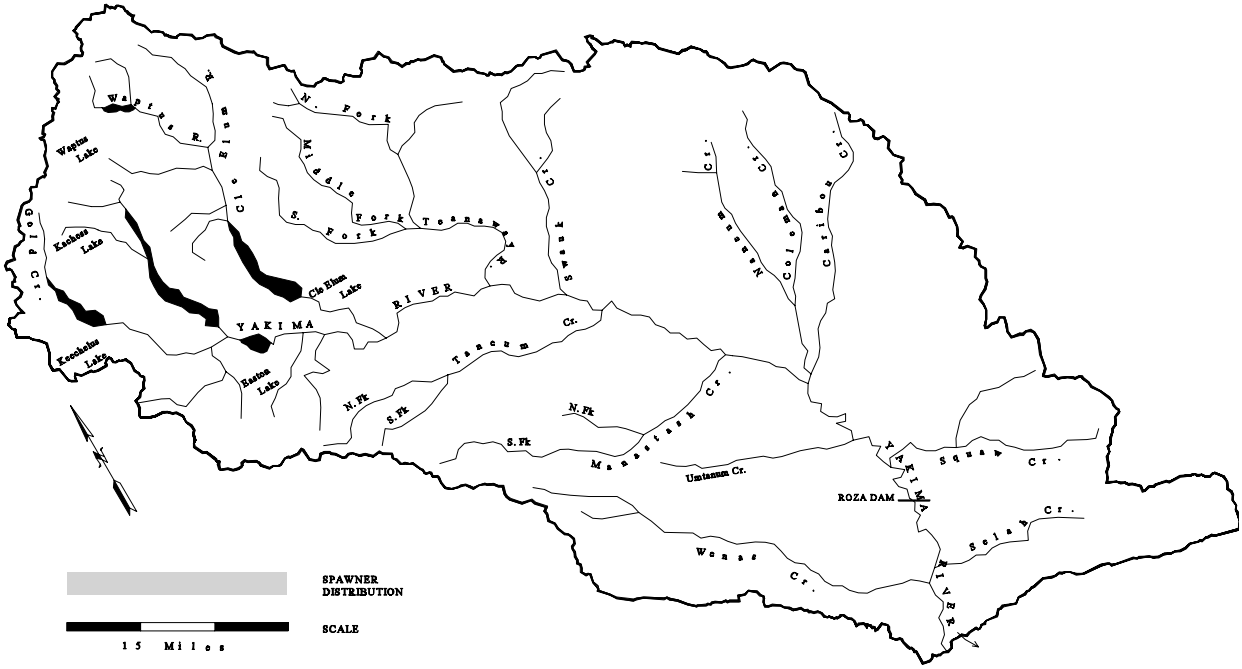
The genetic characteristics of the Cle Elum/Waptus lakes stock have not been determined. No information is available on their relative abundance, or about where and when they spawn. Other stock attributes need to be determined as well, such as age and size structure, sex ratio and fecundity, fry emergence time and survival rates. All we can confirm at this time is that bull trout/Dolly Varden are currently present in Cle Elum Lake. This statement is based on 17 fish that were captured in traps set in the lake during 1990 to 1993 by the National Marine Fisheries Service while conducting studies on the feasibility of reestablishing sockeye salmon in the Yakima basin. Bull trout/Dolly Varden ranged in size from 150 mm to 400 mm. In 1996, biologists from Central Washington University (Paul James, Central Washington University, personal communication) observed several adult bull trout/Dolly Varden in the upper Cle Elum River in late August. These fish appeared to be migrating upstream, presumably to spawn.

STOCK DEFINITION PROFILE for Cle Elum/Waptus Lks Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Cle Elum/Waptus Lakes Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
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96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

STOCK STATUS

Stock status is Unknown. Currently, little information is available to determine the status of the bull trout/Dolly Varden stock in the Cle Elum/Waptus drainage. However, based on recent WDFW surveys there appear to be very low numbers of bull trout/Dolly Varden in the drainage. Status may be Critical.

FACTORS AFFECTING PRODUCTION

Habitat--Habitat factors affecting bull trout/Dolly Varden production within the Cle Elum Lake drainage are not well understood primarily because there is no quantitative information on the bull trout/Dolly Varden stock or on the habitat characteristics in the drainage. However, it is likely that many of the same limiting factors prevalent in other nearby reservoirs where adfluvial bull trout/Dolly Varden stocks exist also affect the Cle Elum drainage since many of the same type of activities occur there (e.g., logging, road construction, irrigation water releases, poaching, natural variations in flows, etc.). Although poor land-use and land-management practices occur in the Cle Elum drainage, in-stream and riparian habitat quality is generally good to excellent in the tributaries, and there is cold, clean water in the lake and in the streams, particularly in the upper portions of the Cle Elum drainage and in the Alpine Lakes Wilderness around Waptus Lake.

The major limiting habitat factor in the Waptus drainage seems to be low stream flows in the upper Waptus River during the late summer migration period. The lake is located in a wilderness area and is not subjected to human development activities. Tributaries of Waptus Lake, especially the upper Waptus River have excellent water quality, in-stream woody debris, pools and backwater rearing areas for bull trout/Dolly Varden.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1986 with a one-fish catch limit and a 20-inch minimum size limit for fish caught in the lake and eight inches for fish caught in streams. In addition fishing for bull trout/Dolly Varden was prohibited in lakes and streams from August 15 to September 30 to protect spawning fish. Beginning in 1992 fishing for bull trout/Dolly Varden was prohibited in the Cle Elum/Waptus drainage.

There is very little historical harvest information for bull trout/Dolly Varden in the Cle Elum/Waptus drainage. One fish was harvested from Cle Elum Lake in 1981 and a few dozen fish harvested from Waptus Lake during the 1940s and 1950s.

Hatchery--Rainbow trout and kokanee have been the primary species stocked into Cle Elum Lake since the early 1930s. Cutthroat trout and rainbow trout have been stocked in higher-elevation lakes of the drainage as well. Kokanee probably have had a positive impact on bull trout/Dolly Varden because they have served as an important food

source. Natural reproduction of kokanee may occur in some tributary streams, but is probably limited. Other than providing food for adult bull trout/Dolly Varden, rainbow and kokanee releases have probably had no impact on bull trout/Dolly Varden in Cle Elum Lake.

Non-native brook trout were stocked in the upper Cle Elum/Waptus drainage in the past, but stocking was eliminated due to concerns over potential hybridization with bull trout/Dolly Varden. Unfortunately, naturally-reproducing brook trout are now prevalent in the upper Cle Elum River, Fish Lake, Cooper Lake and Waptus Lake. This is a very great concern in Waptus Lake because brook trout appear to be abundant in the lake and are probably spawning in tributaries that would be suitable for bull trout/Dolly Varden. Preliminary fisheries surveys in the Waptus lake drainage in summer, 1995 indicate a healthy naturally-reproducing population of brook trout. It is quite possible that bull trout/Dolly Varden are in danger of being extirpated in the Waptus Lake area due to competition and hybridization with brook trout.

Two other exotic predatory species that occur in the drainage are brown trout and lake trout. Brown trout were discovered in Cooper Lake (upper Cle Elum/Cooper River drainage) in 1987. Apparently this species was illegally introduced, probably in the late 1970s. Fisheries surveys conducted in Cooper Lake in 1995 confirmed a wide range of sizes of brown trout, suggesting that natural reproduction is occurring. In 1996, brown trout were discovered in the lower Waptus River by WDFW biologists. We hope that brown trout do not continue to invade other parts of the Cle Elum drainage to compete with or prey on bull trout/Dolly Varden.

Lake trout are present in Cle Elum Lake and although these fish are naturally reproducing in the lake, they do not appear to be very abundant, as evidenced by catch data. However, few anglers have targeted lake trout, thus, it is difficult to estimate their abundance based on current catch data. The species certainly has the potential to compete with or prey on bull trout/Dolly Varden. Lake trout were probably stocked into Cle Elum Lake before 1933.

YAKIMA -- KACHESS LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Kachess Lake bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. They may have originated from a native adfluvial life history form even before the construction of a dam on the Kachess River, a tributary of the upper Yakima River. Fluvial forms may have been present in the area as well, although currently very few are encountered in the mainstem Yakima River below the Kachess drainage. Regardless, construction of the dam in 1905 enlarged the natural lake and relegated the bull trout/Dolly Varden stock to an adfluvial life history. Although the genetic characteristics of the stock have not been determined, Kachess Lake bull trout/Dolly Varden are considered distinct based on the physical and geographical isolation of spawning adults above Kachess Lake Dam.

Adult spawning occurs primarily in Box Canyon Creek but may also occur in the upper Kachess River and in Mineral Creek when adequate flows are available. Although bull trout/Dolly Varden have been observed in the latter two streams, there are no data to confirm spawning activity. Additional investigation is needed. Spawning occurs from early September to mid-October in Box Canyon Creek, although some bull trout/Dolly Varden can be observed holding in the deeper pools in late August.

The majority of adult spawners range from 457 mm to 610 mm in total length, although larger fish have been observed during spawning surveys. Very little information is available on the age composition of the spawning population as only a few fish have been aged. Most spawning adults are probably at least five or six years old with some twice that age. The sex ratio and fecundity are unknown.

Although the timing of fry emergence has not been determined, it is probably occurs in March. Survival rates are unknown. Rearing juveniles probably spend several years in Box Canyon Creek before migrating to Kachess Lake.

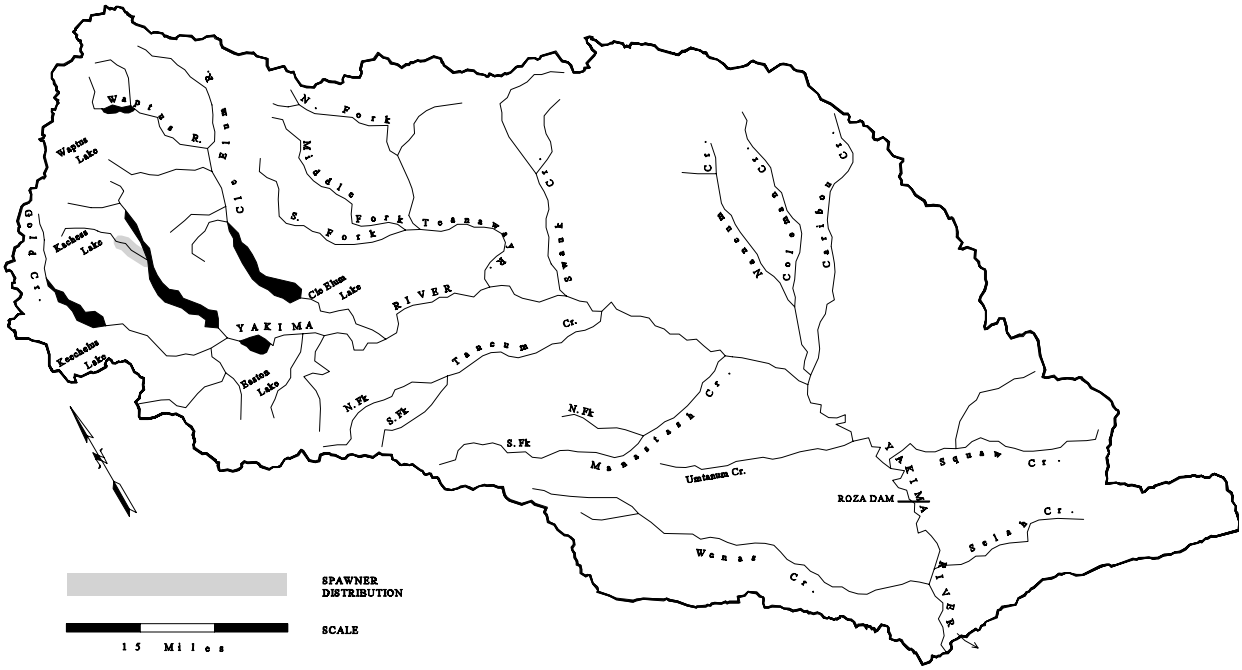
STOCK STATUS

The status of the stock is Critical based on chronically low spawning escapement (redd counts) since 1984. Data quality is excellent. The extremely low population size may have affected the genetic variability of the stock thus decreasing its overall fitness. The highest redd count in Box Canyon Creek was eleven in 1994. There have been fewer than a half-dozen redds in any given year for ten of the last fourteen years (the entire period for which data are available). The Kachess Lake stock is very near extirpation.

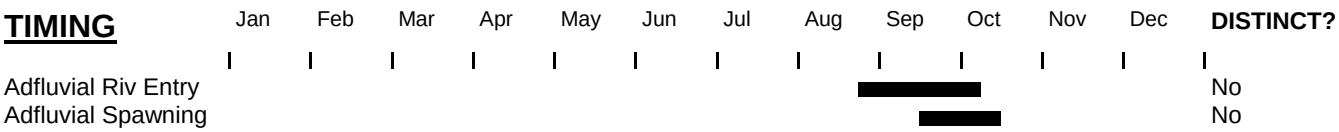
STOCK DEFINITION PROFILE for Kachess Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING



BIOLOGICAL CHARACTERISTICS

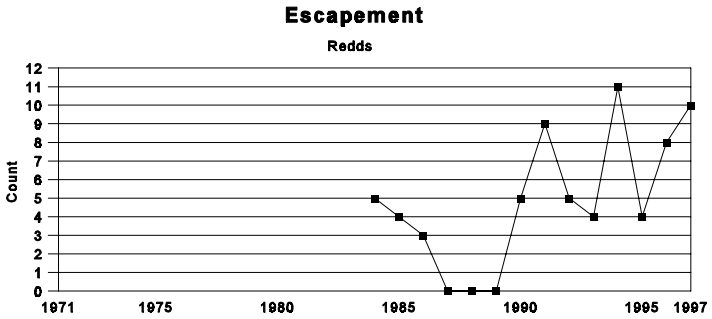
DISTINCT? - Unknown

STOCK STATUS PROFILE for Kachess Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	5			
85	4			
86	3			
87	0			
88	0			
89	0			
90	5			
91	9			
92	5			
93	4			
94	11			
95	4			
96	8			
97	10			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

It is estimated that the redd counts in the Kachess Lake drainage represent more than 98% of the total spawning population. The redds counts are not indicative of the available spawning habitat.

FACTORS AFFECTING PRODUCTION

Habitat--During the spawning period the water level in the reservoir is lowered below the confluence of Box Canyon Creek which causes extremely shallow and dispersed attraction flows that inhibit bull trout/Dolly Varden spawner migrations. In the lower portion of Box Canyon Creek the proximity of undeveloped campsites along the creek has led to the destruction of riparian vegetation in some areas. Otherwise habitat conditions for bull trout/Dolly Varden are good in Box Canyon Creek. In the Kachess River a combination of low stream flows and low reservoir levels due to downstream irrigation demands cause dewatering conditions that inhibit bull trout/Dolly Varden spawning migrations. General logging practices and road construction/maintenance activities increase sediment loads in spawning areas.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1984 with a one-fish catch limit and 20-inch minimum size limit for fish caught in the lake and six inches for fish caught in streams. In 1986 the minimum size limit was increased to eight inches in streams, and fishing for bull trout/Dolly Varden was closed in lakes and streams from August 15 to September 30 to protect spawning fish. In 1987 fishing for bull trout/Dolly Varden was prohibited in Kachess Lake. In addition, there has been a total fishing season closure on sections of Box Canyon Creek, the Kachess River and Mineral Creek since 1990 to protect spawning and early-rearing bull trout/Dolly Varden.

Very little historical harvest information exists for bull trout/Dolly Varden in Kachess Lake or in the tributaries. Bull trout/Dolly Varden have been observed during creel checks but were probably targeted by few anglers due to their lower abundance and because they were not as highly regarded as other gamefish.

Although angling impacts and harvest are not known, they may have been significant in some areas of the drainage, particularly in the spawning tributaries. Large adfluvial bull trout/Dolly Varden were easily harvested from spawning areas prior to the implementation of restrictive fishing regulations in the mid-1980s. Poaching has been a problem in Box Canyon Creek. Easy public access to bull trout/Dolly Varden spawning grounds compounds the problem. We hope that by posting bull trout/Dolly Varden information signs in the area and by increasing enforcement patrols, the incidence of poaching will decrease. Although bull trout/Dolly Varden are occasionally caught in the lake by anglers fishing for other gamefish, bull trout/Dolly Varden are infrequently encountered.

Hatchery--Non-native brook trout were stocked in Kachess Lake in the early 1930s but have not been stocked since. It does not appear that brook trout have established themselves in Kachess Lake, thus hybridization has not been a concern. Lake trout are said to have been stocked into Kachess Lake before 1933, but the introduction was probably unsuccessful. There are no data that confirm the presence of lake trout. Rainbow trout and kokanee were the primary species stocked in the lake for a period of about 50 years. Kokanee probably have had a positive impact on bull trout/Dolly Varden because they have served as an important food source. Natural reproduction of kokanee may occur in some tributary streams, but is probably limited. Cutthroat trout were stocked into Kachess Lake throughout the 1980s. Currently, only cutthroat and kokanee are stocked. Other than providing food for adult bull trout/Dolly Varden, stocking has probably had no impacts.

YAKIMA -- KEECHELUS LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Keechelus Lake bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. They may have originated from a native adfluvial life history form even before the construction of a dam on the Yakima River in 1914. Construction of the dam turned the former natural lake into a large irrigation storage reservoir. Although the genetic characteristics of the stock have not been determined, Keechelus Lake bull trout/Dolly Varden are considered distinct based on the physical and geographical isolation of adfluvial spawning adults above Keechelus Lake Dam. Although they are infrequently encountered, fluvial bull trout/Dolly Varden are found in the Yakima River drainage below the dam (see Yakima stock report).

Adult spawning occurs in Gold Creek from early September to mid-October. Most fish probably enter the creek in early August and hold in the deeper pools, but some fish may enter as much as a month or two earlier. Anecdotal accounts suggest that bull trout/Dolly Varden were present in Rocky Run Creek in the early 1980s, but there have been no recent surveys to confirm their presence.

The majority of adult spawners range from 457 mm to 610 mm in total length, although fish as small as 200 mm have been observed on redds. Limited information indicates the age composition of the spawning population is four to 10+ years of age with a sex ratio of 1:1 and fecundity of several thousand eggs per adult female.

Although the timing of fry emergence has not been determined, it is likely occurs in March. Survival rates are unknown. Rearing juveniles probably spend several years in Gold Creek before migrating to Keechelus Lake.

STOCK STATUS

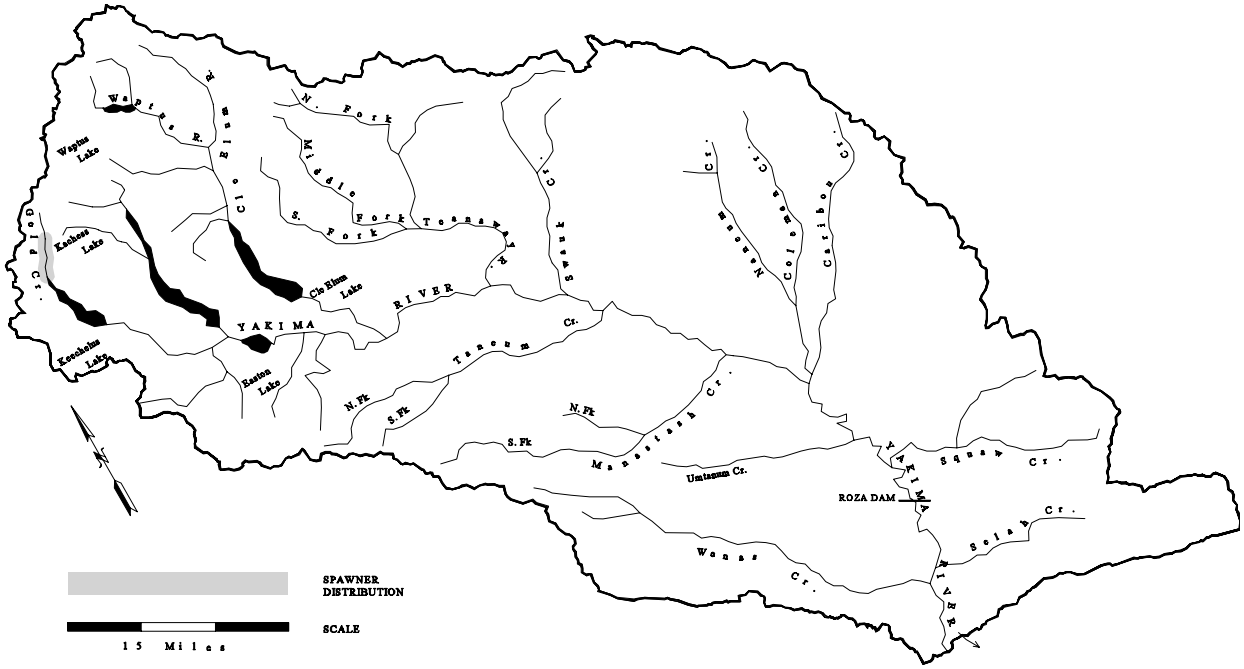
The status of the stock is Critical based on chronically low spawning escapement (redd counts) since 1984. Data quality is excellent. The low population size may have reduced the genetic variability of the stock thus decreasing its overall fitness. Annual redd counts have fluctuated from two to 51 redds since 1984 (the entire period for which data are available). A dramatic increase in the redd counts occurred in 1996 (51 redds) and 1997 (31 redds).

It is estimated that the redd counts in the Keechelus Lake drainage represent more than 98% of the total spawning population. The redd counts are not indicative of the available spawning habitat.

STOCK DEFINITION PROFILE for Keechelus Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Adfluvial Riv Entry								▬					Yes
Adfluvial Spawning									▬	▬			Yes

BIOLOGICAL CHARACTERISTICS

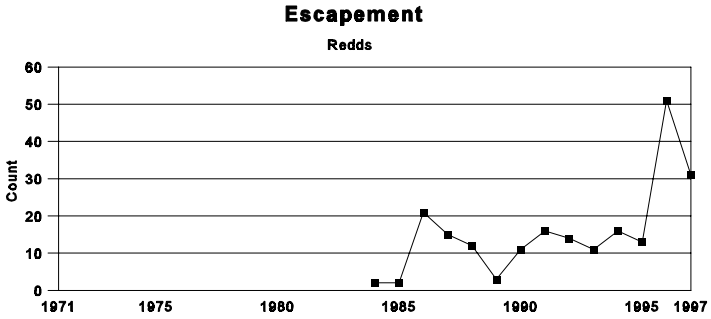
DISTINCT? - Unknown

STOCK STATUS PROFILE for Keechelus Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	2			
85	2			
86	21			
87	15			
88	12			
89	3			
90	11			
91	16			
92	14			
93	11			
94	16			
95	13			
96	51			
97	31			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Critical

Screening Criteria
Chronically low

FACTORS AFFECTING PRODUCTION

Habitat--Physical habitat destruction due to development activities and logging practices have altered the floodplain in the lower section of Gold Creek. This has reduced overhead and riparian cover, elevated stream temperatures, created unstable channel conditions, and increased sediment loads. All of these effects create stressful conditions for spawning and rearing bull trout/Dolly Varden. For example, sediment covers redds and smothers developing eggs, unstable channels create blocks to fish passage, elevated temperatures and sediment loading stress fish and reduce growth and natural productivity. Low stream flows or subterranean flow conditions (dry channels) in the creek block upstream migration of adult spawners and strand adults and juveniles. These conditions are exacerbated by development activities. Studies conducted by the University of Washington in Gold Creek indicate a high mortality rate of adult spawners (approximately 63%) due to stranding caused by low stream flows and dry stream channels (Craig and Wissmar 1993). We do not know what effect large irrigation water releases from Keechelus Lake may have on the stock. Good to excellent habitat conditions still exist in upper Gold Creek where it penetrates into the Alpine Lakes Wilderness.

Harvest Management--Restrictive fishing regulations for bull trout/Dolly Varden began in 1984 with a one-fish catch limit and a 20-inch minimum size limit for fish caught in the lake and six inches for fish caught in streams. In 1986 the minimum size limit was increased to eight inches in streams and fishing for bull trout/Dolly Varden in lakes and streams was closed from August 15 to September 30 to protect spawning fish. In 1987 fishing for bull trout/Dolly Varden was prohibited in Keechelus Lake. In addition, there has been a total fishing season closure on Gold Creek since 1990 to protect spawning and early rearing bull trout/Dolly Varden.

Although anglers have caught bull trout/Dolly Varden in Keechelus Lake and in the tributaries, no historical harvest information is available. Bull trout/Dolly Varden were probably targeted by few anglers due to their low abundance and because they were not as highly regarded as other gamefish.

Although angling impacts and harvest are not known, they may have been significant in some areas of the drainage, particularly in Gold Creek. Large adfluvial spawning bull trout/Dolly Varden were easily harvested from this spawning tributary prior to the implementation of restrictive fishing regulations in the mid-1980s. Poaching has also been a problem in Gold Creek. Easy public access to bull trout/Dolly Varden spawning grounds compounds the problem. We hope that by posting bull trout/Dolly Varden information signs in the area and by increasing enforcement patrols the incidence of poaching will decrease. Although bull trout/Dolly Varden are occasionally caught in the lake by anglers fishing for kokanee, bull trout/Dolly Varden are infrequently encountered.

Hatchery--Non-native brook trout were stocked in the Keechelus Lake drainage in the past, but stocking was eliminated due to concerns over hybridization with bull trout/Dolly Varden. Although brook trout still persist in some areas of the drainage, they are seldom seen in bull trout/Dolly Varden spawning areas, and hybridization has not been observed. Lake trout are said to have been stocked into Keechelus Lake before 1933, but the introduction was probably unsuccessful. There are no data that confirm the presence of lake trout.

Kokanee and rainbow trout were stocked into Keechelus Lake throughout the 1930s and 1940s, but the lake is seldom stocked anymore because the kokanee population is now self-sustaining. Kokanee probably have had a positive impact on bull trout/Dolly Varden because they have served as an important food source. Other than providing food for adult bull trout/Dolly Varden, stocking has probably had no impacts.

OVERVIEW -- WENATCHEE BULL TROUT/DOLLY VARDEN

INGALLS CREEK
ICICLE CREEK
CHIWAUKUM CREEK
CHIWAWA
CHIKAMIN CREEK
ROCK CREEK
PHELPS CREEK
NASON CREEK
LITTLE WENATCHEE
WHITE (WENATCHEE)
PANTHER CREEK

STOCK DEFINITION AND ORIGIN

Currently ten bull trout/Dolly Varden stocks have been identified in the Wenatchee River watershed. They are the Icicle, Ingalls, Chiwaukum, Chikamin, Rock, Phelps, Nason, and Panther creeks stocks and the Little Wenatchee, Chiwawa and White rivers stocks. A population in the Napecqua River is though to be extinct. Adfluvial, fluvial and resident life forms are present.

The bull trout/Dolly Varden in the Wenatchee River watershed are native. No hatchery introduction of bull trout/Dolly Varden has occurred.

Bull trout/Dolly Varden spawn and alevins rear in cold, headwater reaches where annual heat budgets are too cold for steelhead and chinook salmon. The stocks spawn in thermal isolation, because water temperature between spawning sites is too warm.

STOCK STATUS

Four of the ten bull trout/Dolly Varden stocks have been classified as Healthy with the remaining six listed as Unknown based on the trend of available abundance data.

Nearly all suitable spawning habitat is currently used by bull trout/Dolly Varden and present spawning distribution is nearly the same as the distribution prior to European settlement. This habitat is naturally limited because adequately cold water is limited and found in high gradient, headwater reaches where access and flow are limited.

Habitat quantity ebbs and flows with climate, precipitation, and forestation changes. The worst scenario is a warming, drying climate where the forest is removed (e.g., wildfire, disease/parasite, logging, etc.).

WENATCHEE -- INGALLS CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Ingalls Creek bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. This native stock spawns in isolation in Ingalls Creek; the precise reach and timing are unknown. Fluvial fish are known to exist, but more information is needed to determine the presence/absence of resident fish.

Recent snorkeling surveys (USFWS) found fluvial fish judging by their size (457 mm total length). Smaller fish were found upstream, but it is not known if these were resident fish or juvenile fluvial fish. We expect the resident life history form to be present because fish have access to the coldest headwaters, where resident fish would normally be found.

STOCK STATUS

Stock status is Unknown. Data quality is good but limited to presence/absence data. Abundance assessment over time is lacking.

FACTORS AFFECTING PRODUCTION

Habitat--Cold water is plentiful and accessible up to Turnpike Creek. Moreover, the bull trout zone (spawning and fry rearing) is located within the Alpine Lakes Wilderness and remains unspoiled by human activities. Downstream in parent Peshastin Creek, the situation is different with urban and agricultural encroachment; the presence of Blewett Pass Highway with bridges, revetments, and some channelization; and dewatering from irrigation withdrawal. Some rearing habitat for fluvial fish is lost, but migration is unaffected because bull trout/Dolly Varden pass upstream in spring runoff and pass downstream after the irrigation season. Some fluvial fish may rear in the Columbia River, where hydroelectric development has degraded the habitat.

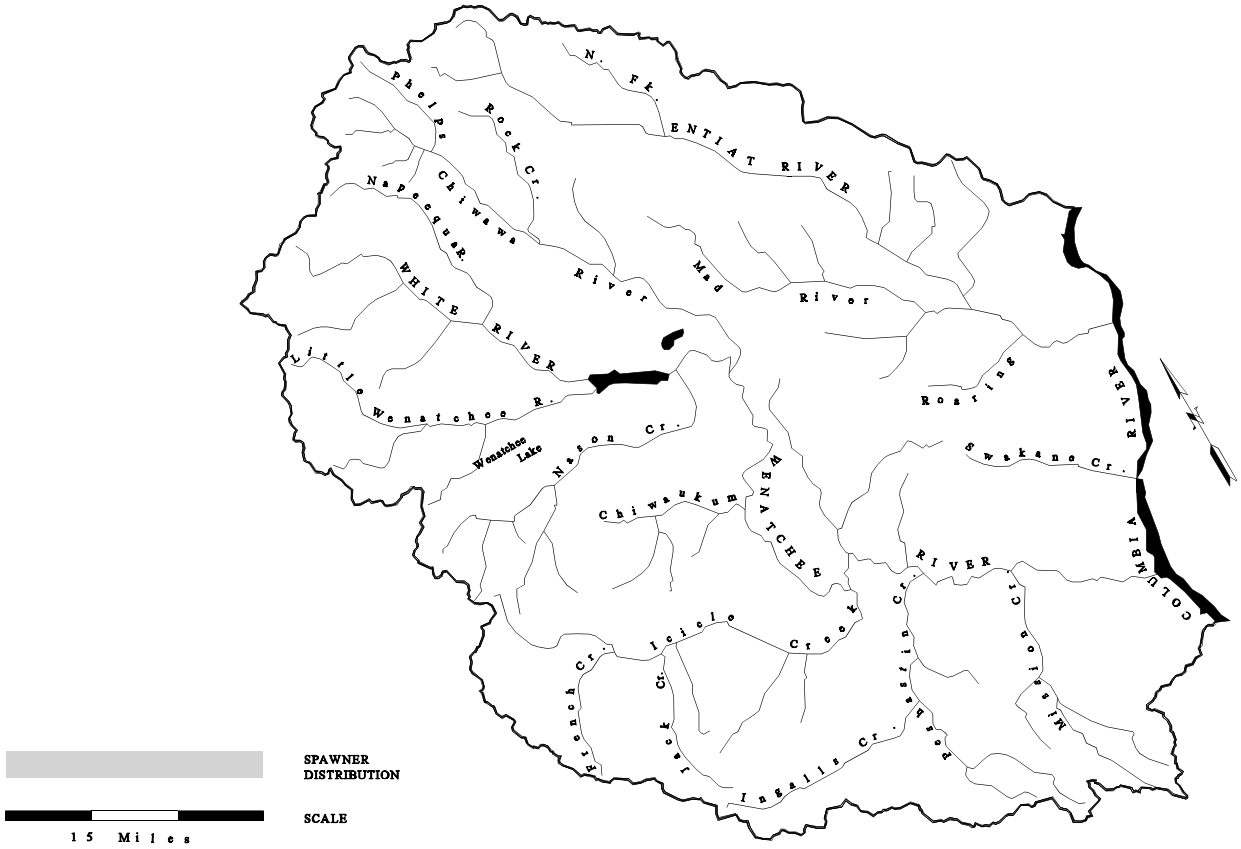
Harvest Management--In Ingalls Creek historically there was a small fishery for fluvial bull trout/Dolly Varden. Today bull trout/Dolly Varden are protected from harvest in Ingalls Creek. Some losses may occur when anglers using bait catch and release bull trout/Dolly Varden incidentally to fishing for other species. Poaching of conspicuous fluvial spawners is expected (and confirmed in 1990 with a single example), given that people are aware of this stock. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for Ingalls Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Ingalls Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Hatchery--Rainbow trout and cutthroat trout have been released into the headwaters lake of Ingalls Creek (Ingalls Lake). Steelhead and rainbows have been released into Peshastin Creek. These releases were discontinued in the late 1980s. They are not thought to have had lasting effects on bull trout/Dolly Varden in this drainage.

Species Interactions--Anadromous species use Ingalls Creek up to RM 4.7. Rainbow trout are stocked in Ingalls Lake, the source of Ingalls Creek, and have spread downstream throughout the creek. Rainbow trout prefer warmer water than bull trout/Dolly Varden and successfully replace them when temperature favors them. But considering the large amount of cold water in Ingalls Creek, based on river miles accessible to bull trout/Dolly Varden over 3,000 feet in elevation, the risk of rainbow trout replacing bull trout/Dolly Varden is low in the foreseeable future.

WENATCHEE -- ICICLE CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This is a native and distinct stock isolated geographically from other stocks by water temperature and by the U.S. Fish and Wildlife Service dam at Leavenworth National Fish Hatchery (RM 2.8). Resident fish are found above the dam, but spawning distribution and timing are unknown. Fluvial fish return to the base of the dam and must be recruits from the resident fish above the dam, since fluvial fish, with rare exceptions, are blocked from reaching headwater spawning habitat.

STOCK STATUS

Stock status is Unknown. Snorkel surveys were conducted by the U.S. Fish and Wildlife Service in 1994 in Icicle Creek (RM 4.0 to 21.8) and two tributaries, Trout (RM 0.0 to 1.1) and Jack (RM 0.0 to 0.6) creeks. A total of three juvenile bull trout/Dolly Varden were observed. The salmonid biomass was predominately rainbow trout, which is expected in the river below the barrier falls at RM 24.0. Data quality is excellent, but surveys proved to be downstream of the spawning and initial rearing habitat for bull trout/Dolly Varden.

The most likely headwater reach (Leland Creek to Trapper Creek) was surveyed by WDFW in 1997. Rainbow trout predominated. Brook trout were common, and some cutthroat trout were found in Trapper Creek and Icicle Creek above Trapper Creek, but no bull trout/Dolly Varden were captured. Data quality is excellent, but it now appears that resident bull trout/Dolly Varden spawning is not located in Icicle Creek itself but rather in tributary streams. Upper French and Leland Creeks are likely sites.

FACTORS AFFECTING PRODUCTION

Habitat--Icicle Creek is a fourth-order stream that is 31.8 miles long and drains a basin of 211 square miles containing 14 glaciers and 102 lakes. The spawning habitat of bull trout/Dolly Varden is on U.S. Forest Service land within the Alpine Lakes Wilderness. State and private property amounting to 13% of the basin is concentrated in the lower basin. Minimum flow at RM 24.0 (falls) is 23 cfs. The gradient between French and Trapper creeks, the reach most likely for bull trout/Dolly Varden spawning, is 1.2%, and elevation ranges from 2,875 to 3,3360 feet.

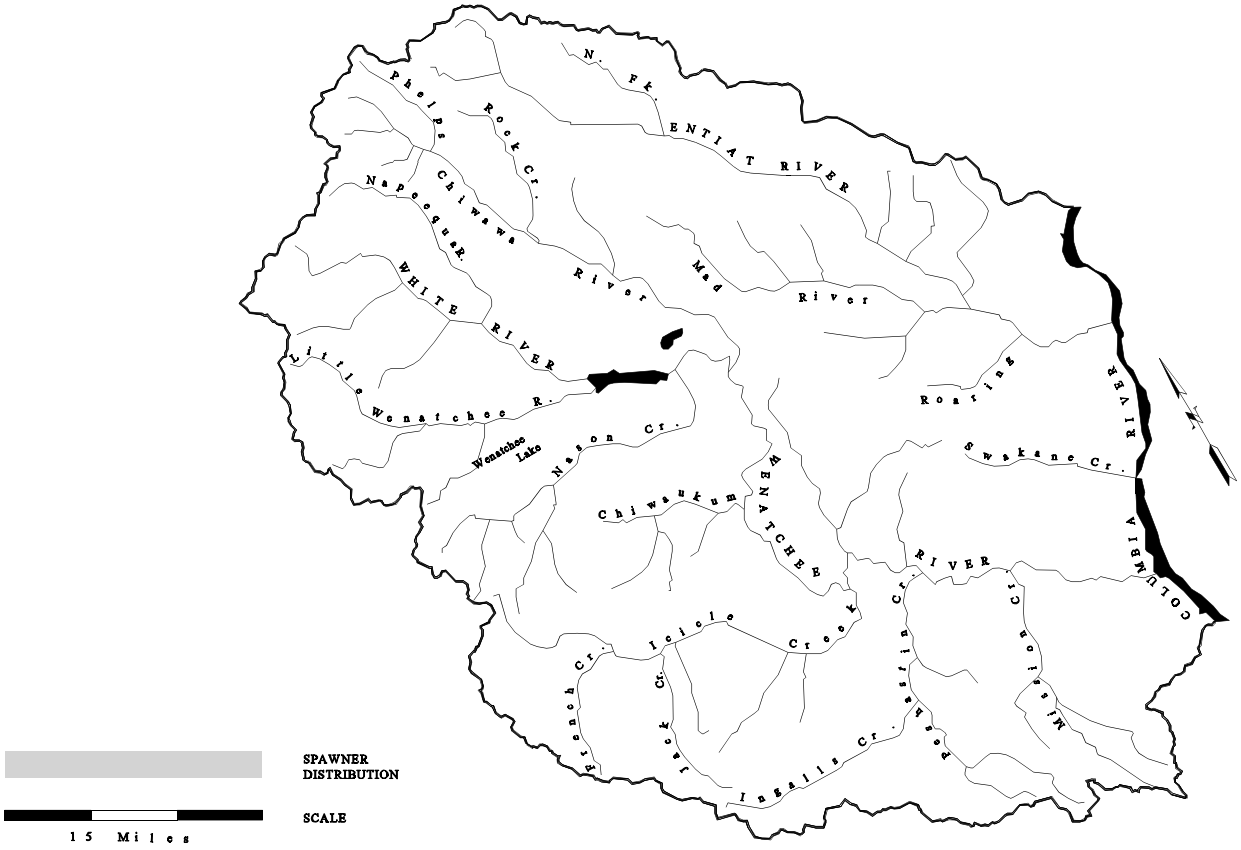
Upper Icicle Creek, where bull trout/Dolly Varden spawn, is unaltered by human activity. The middle and lower sections are roaded, and several irrigation withdrawals are made, some of which may not be screened. The Leavenworth National Fish Hatchery dam, built in 1939-1940, blocks upstream passage of anadromous species and migratory bull trout/Dolly Varden.

STOCK DEFINITION PROFILE for Icicle Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Icicle Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Cold water may be limited in this basin above RM 9.0 where bull trout/Dolly Varden are likely to spawn because the basin elevation is relatively low, glaciers are absent, and there are many lakes. Conversely, the Stuart Range has high elevation and contains 14 glaciers, but the streams which drain the glaciers are too steep for fish and enter Icicle Creek below the bull trout/Dolly Varden zone.

Harvest Management--Fluvial fish neither successfully spawn below the hatchery dam nor pass it, so harvest is irrelevant. Historically, there was no bull trout/Dolly Varden fishery in upper Icicle Creek. Bull trout/Dolly Varden are now protected from harvest in Icicle Creek. Catches now and in the past are incidental to catches mostly of rainbow trout. Most spawning probably takes place above the reach from Rock Island Bridge to Leland Creek, which is regulated by selective fishery rules (bait is not allowed) for other species. Above this reach, fish are subjected to higher hooking mortality inherent in using bait, but angling intensity is minimized by the ten-mile hike and dense streamside cover.

Hatchery--Leland Creek was stocked with rainbow trout fry annually from 1937 to 1940. If these fish were successfully established above the falls in the absence of native rainbow trout, they may have replaced bull trout/Dolly Varden upstream to the area where colder temperature favors bull trout/Dolly Varden.

A single brook trout introduction was made in 1956 into upper Icicle Creek, but it is unclear if these fish were released above or below the falls. U.S. Fish and Wildlife Service snorkel surveyors found three brook trout below the falls. A WDFW hook-and-line survey in the headwaters of Icicle Creek (from Leland Creek to Trapper Creek) showed that brook trout are widely distributed above the falls and likely threaten bull trout/Dolly varden in this sub-basin.

Species Interactions--Prior to 1939-1940, when upstream migration was blocked by installation of the hatchery dam, anadromous fish and migratory bull trout/Dolly Varden had access up to an impassible falls at RM 24.0. The ubiquitous resident steelhead trout is the prevalent salmonid below and above the falls. Of grave concern is the presence of brook trout, whose similarities in habitat preference and biology allow them to hybridize with bull trout/Dolly Varden, and eventually to eliminate them. More information is needed to determine if bull trout/Dolly Varden are isolated from brook trout in Icicle Creek.

WENATCHEE -- CHIWAUKUM CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Although spawn timing and location are unknown, Chiwaukum Creek bull trout/Dolly Varden have been identified as a distinct stock based on their geographical distribution. Anecdotal accounts tell of fishing on concentrations of large pre-spawners, which suggests that the fluvial life history form is present. Most migratory bull trout/Dolly Varden probably rear in the Wenatchee River, but some may move upstream into Lake Wenatchee. Chiwaukum Creek has sufficiently cold water to support resident bull trout/Dolly Varden if barriers do not block access to cold upstream reaches. Anadromous fish and possibly fluvial bull trout/Dolly Varden are blocked by the falls at RM 4.3.

Chiwaukum Creek bull trout/Dolly Varden are native and are maintained by wild production.

STOCK STATUS

Stock status is Unknown. Presence\absence data are based on anecdotal angler input. Quantitative information is limited to a single electrofishing survey in 1990 and a hook-and-line survey in 1997. The bull trout/Dolly Varden collected in 1990 were heavily vermiculated and may have been brook trout. No bull trout/Dolly Varden were found in 1997 from Foolhen Creek to the South Fork. Data quality is good, but reaches which may support bull trout/Dolly Varden have not been surveyed. More surveys are needed to determine if bull trout/Dolly Varden still reside in this creek.

FACTORS AFFECTING PRODUCTION

Habitat--This creek is a third-order stream that measures 11.5 miles in length. The basin contains one glacier and 16 lakes and covers an area of 50 square miles. The presumed upper spawning limit is the falls at RM 4.3 where the elevation is 2,680 feet. The gradient between RM 3.3 and 4.3 is 4.0%. Minimum flow is 23 cfs. The creek, particularly the spawning habitat, lies mostly on U.S. Forest Service property, but a portion of the lower stream is on Washington Department of Natural Resources land.

The basin is isolated and pristine. The cold water originates from high-altitude ridges and meltwater from one glacier. The creek is a high-gradient, boulder stream that seems ideal for bull trout/Dolly Varden except for possible restricted access.

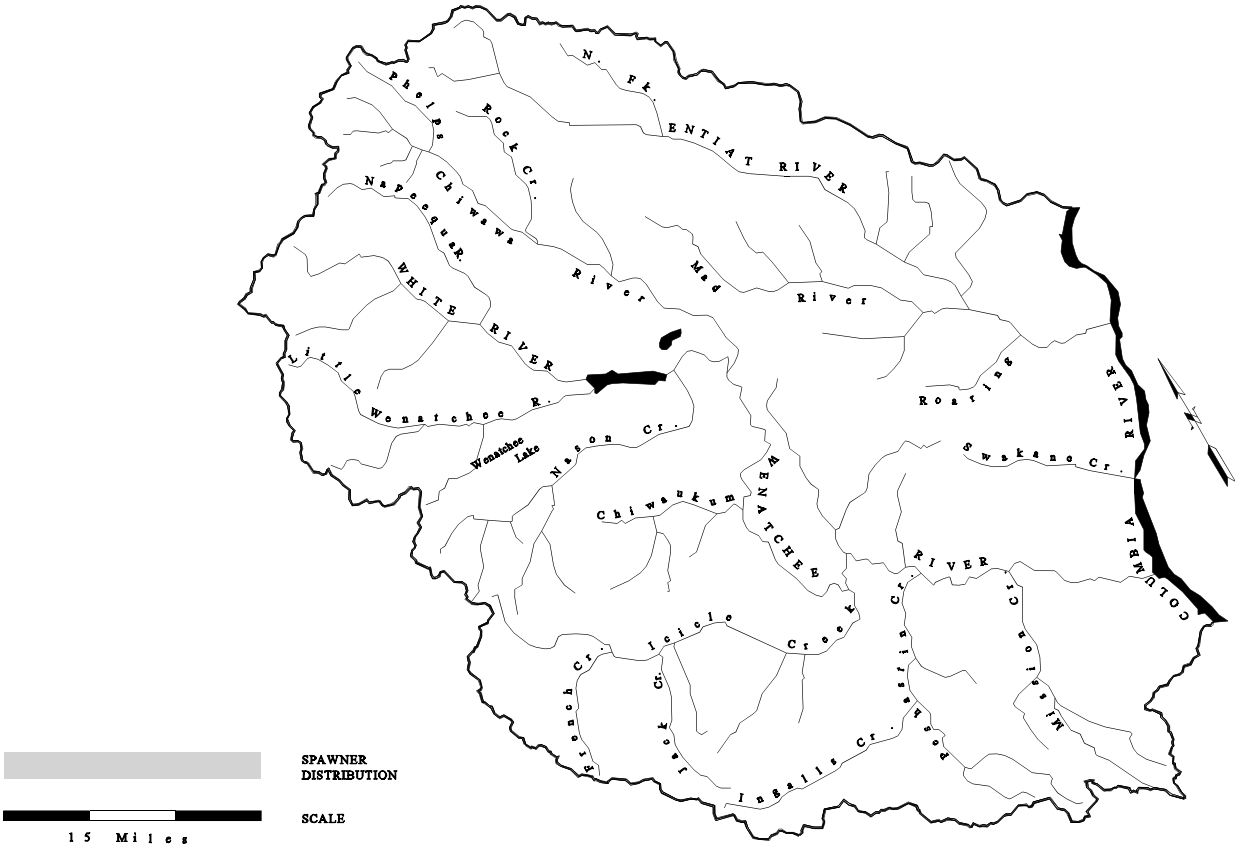
The Columbia River's productivity for fluvial bull trout/Dolly Varden has been reduced by hydroelectric development. Dams kill some migrants and block migration of others.

STOCK DEFINITION PROFILE for Chiwaukum Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Chiwaukum Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
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92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Harvest Management--In the past, when bull trout/Dolly Varden harvest was permitted, a few local anglers fished for them. Currently, fishing for trout remains open but under selective fishery regulations (bait is not permitted). Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--In 1899 a salmon hatchery was constructed on lower Chiwaukum Creek, but closed only five years later in part because of cold water and heavy snow. It is unclear what effect, if any, the presence and operation of the hatchery had on bull trout/Dolly Varden.

Many native rainbow and cutthroat trout fry from Chiwaukum Hatchery (resurrected by the Washington Department of Game in the 1930s) were stocked into wild populations of rainbow and bull trout/Dolly Varden in Chiwaukum Creek in the 1930s and 1940s. Since introductions of hatchery-origin rainbow trout did not increase distributions of native rainbow trout, interactions with bull trout/Dolly Varden are not considered harmful or lasting. Apparently populations of cutthroat trout were established from hatchery releases, but cutthroat and bull trout/Dolly Varden are ecologically compatible.

Species Interactions--Rainbow trout and chinook salmon are found in the lower portion of Chiwaukum Creek, and will invade upstream if the water temperature warms. This risk is relatively high because cold water is scarce below the falls. We do not know whether bull trout/Dolly Varden are obstructed by the falls and denied access to the cold water above the falls that would protect them from downstream invaders. Brook trout may be found above the falls and, if so, pose a grave risk to bull trout/Dolly Varden.

WENATCHEE -- CHIWAWA BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This native stock of fluvial fish is considered distinct based on the geographic distribution of its spawning grounds. Spawn timing is typical of Columbia River bull trout/Dolly Varden, from mid-September through mid-October. Rearing may occur in the Chiwawa, Wenatchee, and Columbia rivers. Some fish may rear in Lake Wenatchee. Spawning areas in the Chiwawa River begin at Phelps Creek (RM 30.2) and end at the falls at RM 33.1. These areas are contiguous with those from lower Buck Creek to the falls impasse. There is minor spawning in lower Alpine and James Creeks.

STOCK STATUS

Stock status is Unknown. Based on the limited survey this stock may by Healthy. Trend data are needed to better assess the stock status.

Redds were counted (single surveys) in 1989 and 1990 in Buck and Alpine creeks and the Chiwawa River. The counts in 1990 may be low due to high flows. Isolation and excellence habitat may be the major factors in monitoring a healthy stock in this drainage. Downriver hooking mortality and illegal harvest are the only obvious factors affecting this stock. Data quality is fair.

FACTORS AFFECTING PRODUCTION

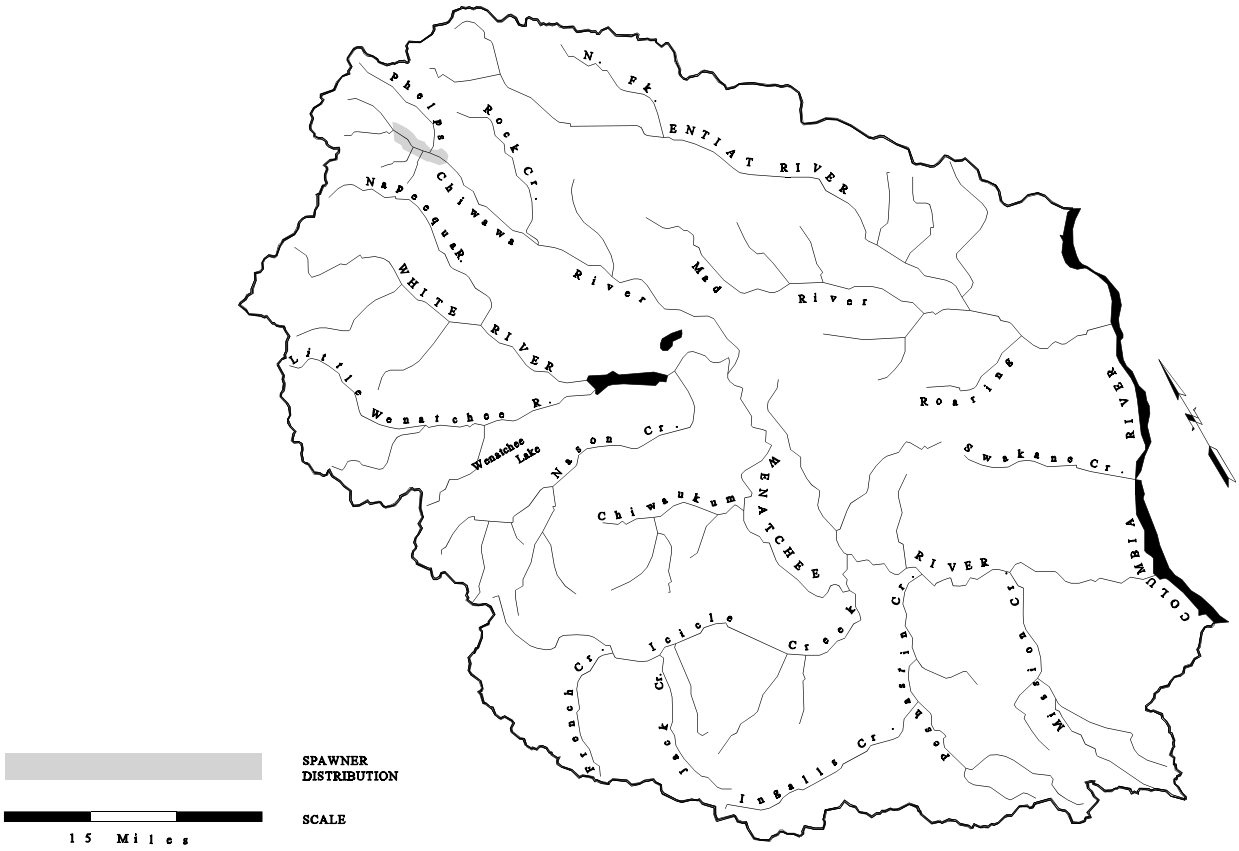
Habitat--The Chiwawa River is a fourth-order stream that is 36.0 miles long and drains a basin measuring 182 square miles and containing five glaciers and six lakes. At RM 30.5 minimum flow is 20 cfs. The gradient between Phelps Creek and the falls is 3.3%, and elevation ranges from 2,780 to 3,280 feet. Except for a small private holding at Trinity, the upper river lies on U.S. Forest Service land in the Glacier Peak Wilderness.

Trinity marks the end of the Chiwawa Valley Road (U.S. Forest Service Road 6200), beyond which the habitat is isolated and pristine. The cold river water temperature is ideal for bull trout/Dolly Varden. Glacial meltwater from Phelps Creek chills the upper Chiwawa River below Trinity.

STOCK DEFINITION PROFILE for Chiwawa Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Chiwawa Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	ESCAPE Redds	ESCAPE Redds	ESCAPE Redds	
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	21	16	3	
90	8	1	0	
91				
92				
93				
94				
95				
96				
97				

Columns 1: Buck Creek count.
Column 2:: Alpine Creek count
Column 3: Counts from the Chiwawa River.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Harvest Management--Road access ends at Trinity. A trail runs above the river in many places, but access is mostly difficult. Bull trout/Dolly Varden are protected from harvest, but bait is allowed in fisheries targeting other species downriver to Rock Creek where selective regulations (no bait allowed) are in force. Hooking mortality and illegal harvest probably are insignificant in the Chiwawa River above Trinity. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Rainbow trout fry produced from Chiwaukum Hatchery were released to the headwaters of the Chiwawa River in 1944 and 1948, but the water was too cold and they did not survive.

For many years catchable-size rainbow trout were released into the Chiwawa River below Trinity in the summer. Resulting fisheries increased harvest on all migratory stocks of bull trout/Dolly Varden within the basin. The program was discontinued in 1990.

Species Interactions--The water in the Chiwawa River is so cold that the upper boundary of rainbow trout distribution is more than nine miles downriver from bull trout/Dolly Varden spawning and early rearing areas, offering maximum buffering from climatic warming and invasion by rainbow trout.

WENATCHEE -- CHIKAMIN CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Chikamin Creek bull trout/Dolly Varden are a native, distinct stock of fluvial fish that is geographically isolated from other Chiwawa River stocks. They spawn from U.S. Forest Service Road 6200 to slightly past the forks (the upper boundary of the redd count index reach) from mid-September through mid-October. The high elevation and resulting cold water at the upper end of their distribution suggests that the resident life history form may also be present.

Chikamin, Phelps and Rock creeks are the major spawning reaches for Chiwawa River bull trout/Dolly Varden. Some spawning also occurs in the mainstem Chiwawa River above Phelps Creek and in James, Alpine and Buck creeks.

The high number of bull trout/Dolly Varden passing the salmon weir on the lower Chiwawa River indicates that substantial rearing occurs outside the Chiwawa River basin, i.e., in the Wenatchee and Columbia rivers and, perhaps, in Lake Wenatchee.

STOCK STATUS

Stock status is Healthy. Redd count monitoring started in 1989. Redds are surveyed over the 4.6 miles (RM 0.8-5.4) from Marble Creek to the forks. Counts are complete except for 1990, when flooding reduced access and visibility. Data quality is excellent. Counts are highly variable across years, but the trend is stable.

FACTORS AFFECTING PRODUCTION

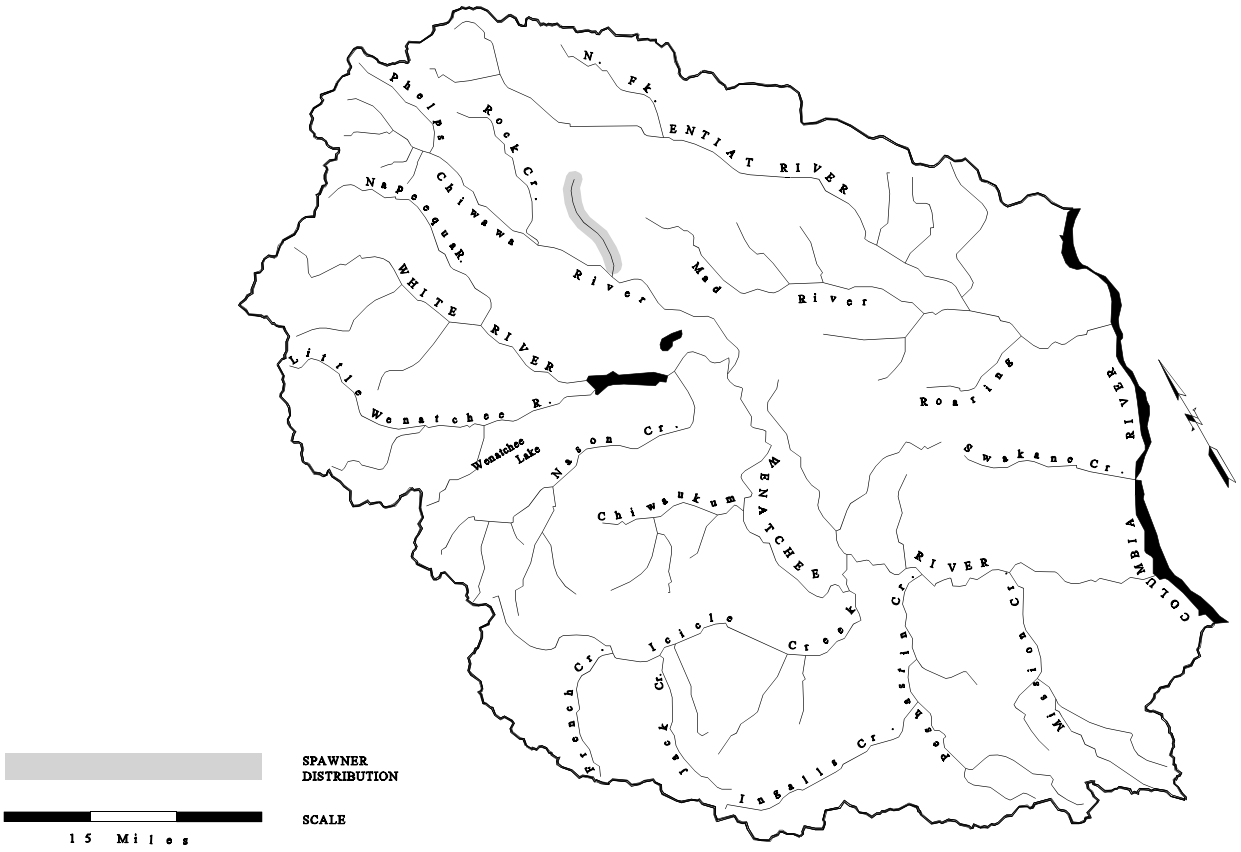
Habitat--Chikamin Creek is a third-order stream that is 7.4 miles long and drains a basin of 21 square miles. Spawning occurs from RM 0.5 to RM 5.5, where the gradient is 4.6%, and elevation varies from 2,410 to 3,760 feet. Minimum flow is 7 cfs. The lower mile is on private land; the remainder, including almost all of the bull trout/Dolly Varden spawning reach, is on U.S. Forest Service land.

The Chikamin Creek basin is nearly roadless and essentially pristine. The gradient near the valley floor is moderate and contains most of the spawning gravels and large woody debris. Gradient increases upstream as the stream enters a steep canyon,

STOCK DEFINITION PROFILE for Chikamin Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												No

BIOLOGICAL CHARACTERISTICS

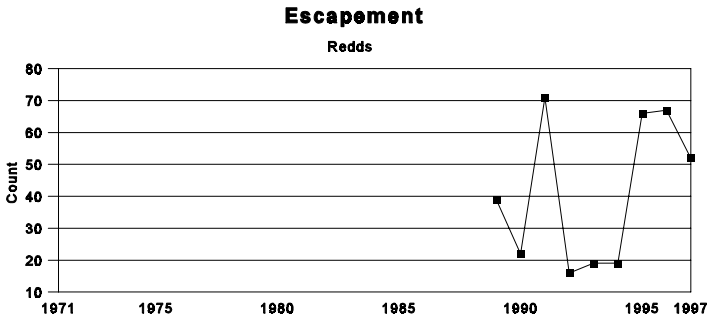
DISTINCT? - Unknown

STOCK STATUS PROFILE for Chikamin Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	39			
90	22			
91	71			
92	16			
93	19			
94	19			
95	66			
96	67			
97	52			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

where gravel is found in small patches and cover is composed of boulders and overhanging brush.

The capacity of the Columbia River to rear fluvial bull trout/Dolly Varden has been diminished from the environmental and ecological changes resulting from the impoundment of a free-flowing river. Dams may kill or block some migrating bull trout/Dolly Varden.

Harvest Management--In-stream fishing-related mortality such as hooking mortality and poaching is considered insignificant because the taking of bull trout/Dolly Varden is illegal, and access is difficult. Hooking mortality and illegal harvest probably are insignificant in the Chiwawa River above Trinity. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Rainbow trout and cutthroat trout fry were released on top of native rainbow and bull trout/Dolly Varden populations several times in the 1930s and 1940s. Resulting interactions are not considered negative because the rainbow trout distribution has not expanded, and established cutthroat trout and bull trout/Dolly Varden are ecologically compatible.

Species Interactions--Wild rainbow trout are found in the Chiwawa River and lower Chikamin Creek and will invade upstream if water temperatures warm. The most elevated reach of distribution is high (cold) enough to offer moderate resistance to warming.

WENATCHEE -- ROCK CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This is a native stock of fluvial fish that is geographically isolated during spawning. Spawning occurs from U.S. Forest Service Road 6200 to the barrier falls (RM 5.8). Spawn timing is from mid-September through mid-October. It is possible that some fish rear in Lake Wenatchee, but most probably rear in the Chiwawa, Wenatchee, or Columbia rivers.

STOCK STATUS

Stock status is Healthy. Redd counts commenced in 1989. The entire spawning reach (4.9 miles- from Forest Service Road 6200 to the falls) is examined. Counts are complete except for 1990, when flooding impaired access and visibility. Data quality is excellent .

Spawning escapements are variable, but the trend is stable over the seven-year monitoring period. Escapements into Rock Creek are much higher than in any other stream in the mid-Columbia region.

FACTORS AFFECTING PRODUCTION

Habitat--Rock Creek is a third-order stream that is 11.7 miles long. The basin area is 21 square miles. The spawning area is from RM 0.6 to RM 5.3, where the gradient is 4.9%, and elevations range from 2,500 to 3,720 feet. Minimum low flow is 11 cfs. The entire basin is on U.S. Forest Service land, and the upper basin is in the Glacier Peak Wilderness.

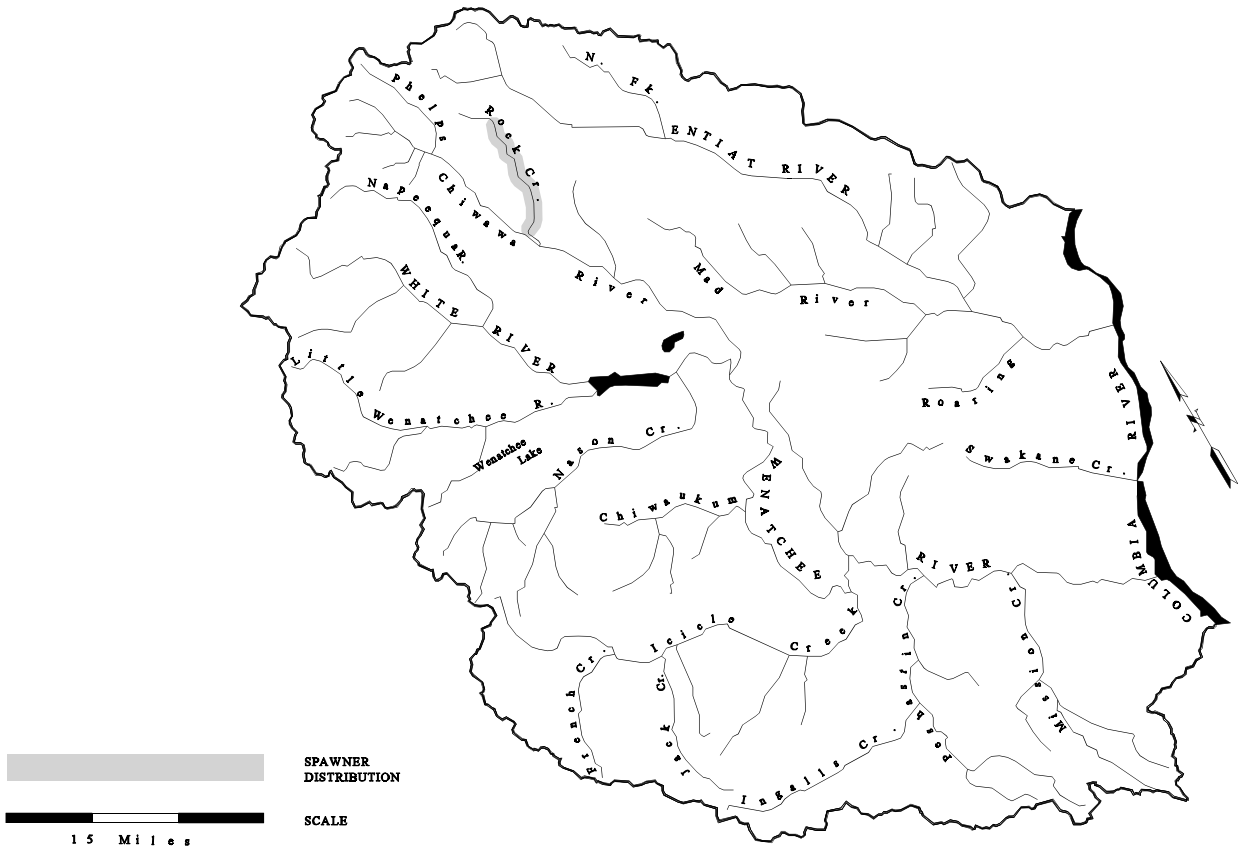
Roading is limited to the lower mile of western part of the basin, where some timber harvesting once occurred, and an old mine shaft remains. Campgrounds are denuded of vegetation at a few points near the mouth. But habitat alterations by human activities have been minor and are confined to the lower basin. Habitat for bull trout/Dolly Varden remains essentially pristine.

Anadromous species use the lower mile of stream, where low gradient causes gravel deposition and active meandering across the floodplain. Above this reach, the stream climbs into a steep, narrow, forested canyon, where it becomes torrential and cover consists of boulders and turbulence. Spawning gravel is limited and scattered. Large woody debris and pools are scarce. The U.S. Forest Service has proposed a habitat rehabilitation project that would improve habitat diversity (add pools and large woody

STOCK DEFINITION PROFILE for Rock Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

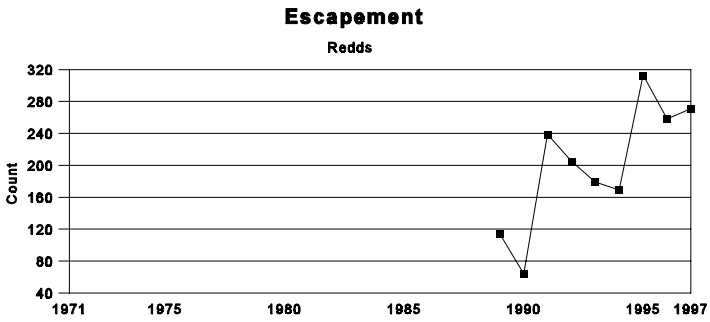
DISTINCT? - Unknown

STOCK STATUS PROFILE for Rock Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	114			
90	64			
91	239			
92	205			
93	179			
94	169			
95	313			
96	258			
97	271			



The 1990 survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

debris) and stabilize streambanks of erodible, barren soils, though sedimentation is not a key limiting factor now.

Downriver, migrant bull trout/Dolly Varden find the Columbia River less productive due to hydroelectric development and encounter migration problems that are lethal to some fish.

Harvest Management--Fishing pressure is concentrated at the campgrounds near the mouth of Phelps Creek. Hatchery-origin catchable-size rainbow trout were planted here for many years, and intense fisheries developed. This program was abandoned after 1990. Bull trout/Dolly Varden are now protected from harvest. Hooking mortality from the use of bait in trout fisheries is probably insignificant because most bull trout/Dolly Varden move upstream into less accessible reaches, where angling effort is low. The level of poaching of fluvial spawners is unknown, but local anglers long have been knowledgeable about the presence of bull trout/Dolly Varden in the Chiwawa River basin, and upper Rock Creek is served by trail. Hooking mortality and illegal harvest probably are insignificant in the Chiwawa River above Trinity. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--From 1933 to 1948 cutthroat trout fry and rainbow trout fry were stocked seven and eight times, respectively. Rainbow trout stocking has not expanded the original distribution of rainbow trout because the water in Rock Creek is too cold for them. Though cutthroat trout have become established, they are ecologically compatible with bull trout/Dolly Varden.

Species Interactions--Chinook salmon and rainbow trout reside in lower Rock Creek, and the latter will invade upstream bull trout/Dolly Varden habitat if water temperature rises over the long term. Full invasion does not appear imminent considering the 5.8 river miles of habitat. However, the southern exposure, absence of glaciers, and relatively low elevation of Rock Creek mean that the lower basin may be sensitive to warming.

WENATCHEE -- PHELPS CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This native stock is considered distinct based on its geographic distribution. Spawning is confined to Phelps Creek from U.S. Forest Service Road 6200 (RM 0.3) to the falls impasse near Box Creek (RM 2.1). Spawning occurs from mid-September through mid-October. The size of spawners indicates that the stock is fluvial. Fluvial fish may rear in the Chiwawa, Wenatchee, or Columbia rivers. Some migrant fish may rear in Lake Wenatchee.

STOCK STATUS

Stock status is Healthy. Trend data are based on redd counts which began in 1989. Redds are surveyed over the 1.9 miles from the Forest Service road to Box Creek. Counts are complete in this reach except for 1990, when flooding impaired access and visibility. Data quality is excellent. Trends have been stable with high annual variability.

FACTORS AFFECTING PRODUCTION

Habitat--Phelps Creek is 8.0 miles long. It is a third-order stream draining a basin area of 16 square miles and with a mean elevation of 5,823 feet. Minimum flow of 12 cfs occurs in September. Spawning occurs between RM 0.3 and 2.1, where the gradient is 9.1%, and elevation ranges from 2,820 to 3,620 feet. Spawning habitat is on U.S. Forest Service land, but two private mine holdings are located upstream.

Roading is limited to the lower basin. Hard rock mining occurred at Trinity (lower Phelps Creek) and upstream near Chipmunk Creek with limited or no impact. Habitat is functionally unaltered as far as is known. Water temperature is ideal for bull trout/Dolly Varden.

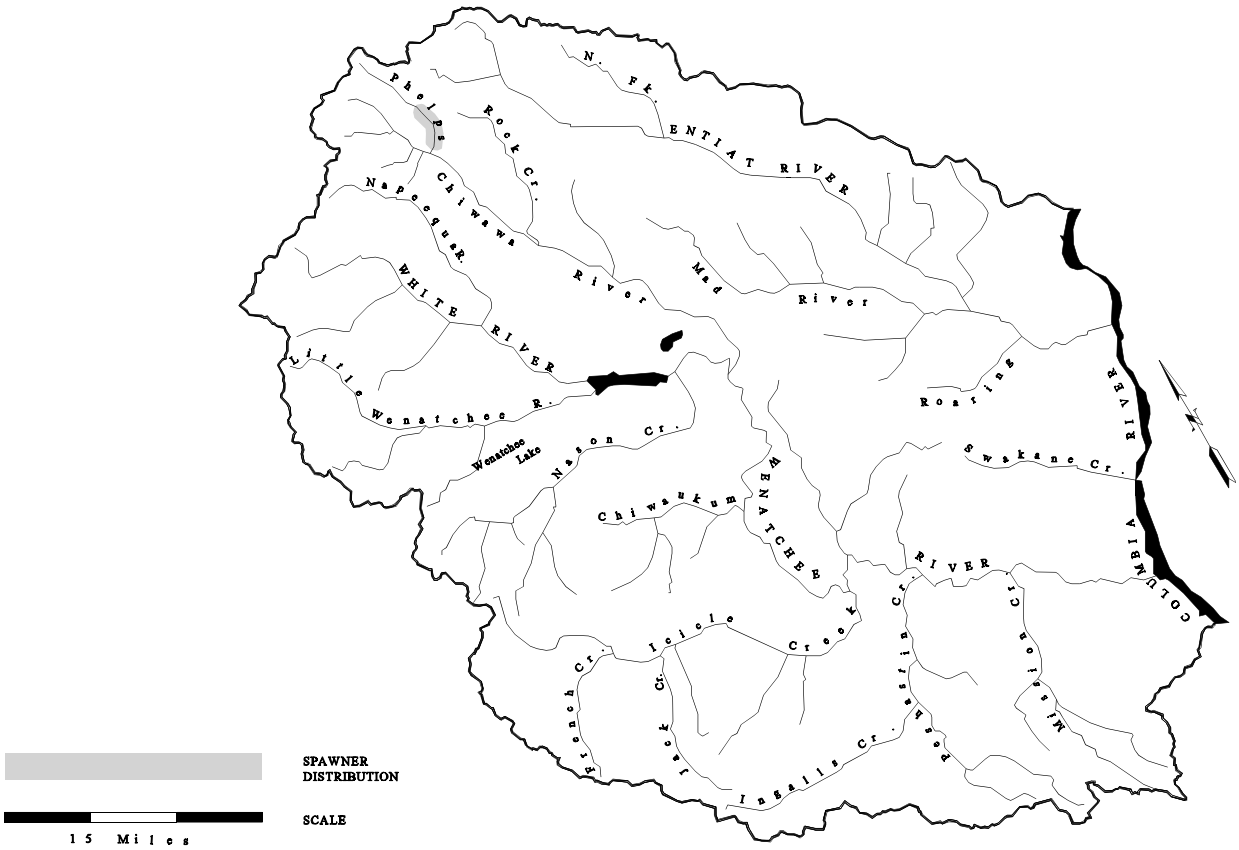
Hydroelectric development reduces the capacity for rearing fluvial bull trout/Dolly Varden in the Columbia River. Dams kill or obstruct some migrants.

Harvest Management--A campground near the mouth of Phelps Creek intensifies angling there. Upstream, the topography is steep, and there is no trail. Bull trout/Dolly Varden are protected from harvest in Phelps Creek. Hooking mortality and illegal harvest probably are insignificant in Phelps Creek itself and in the Chiwawa River above Trinity. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for Phelps Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

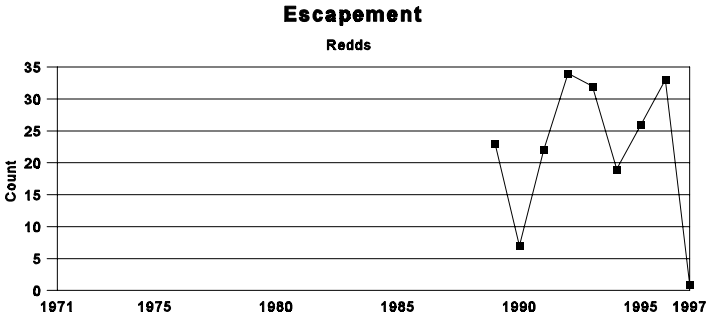
DISTINCT? - Unknown

STOCK STATUS PROFILE for Phelps Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	23			
90	7			
91	22			
92	34			
93	32			
94	19			
95	26			
96	33			
97	1			



The 1990 and 1997 surveys were incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

Hatchery -- Between 1933 and 1943 rainbow trout fry were released into Phelps Creek five times and cutthroat trout fry three times. Potential adverse effects on bull trout/Dolly Varden from rainbow trout have not occurred because the water in Phelps Creek is too cold for rainbow trout to colonize. Introduced westslope cutthroat trout colonized the creek, but they are ecologically compatible with bull trout/Dolly Varden.

Species Interactions--The upper limit of rainbow trout distribution in the Chiwawa River occurs at RM 21.5, 8.9 miles below the mouth of Phelps Creek. High elevation and glacial meltwater produce low water temperature that resists invasion of rainbow trout into Phelps Creek and the upper Chiwawa River.

WENATCHEE -- NASON CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This native stock is considered distinct due to geographic isolation of its spawning grounds. Spawning is confirmed in lower Mill Creek. Nason Creek from Gaynor Falls to Mill Creek may also be an important spawning reach. Spawn timing is unknown. Nason Creek enters the Wenatchee River at the outlet of Lake Wenatchee, and bull trout/Dolly Varden parr migrating from Nason Creek may rear in either environment, becoming adfluvial (Lake Wenatchee) or fluvial (Wenatchee River) fish. Resident fish are undoubtedly absent from this basin because the water is not cold enough for them.

STOCK STATUS

Stock status is Unknown. Anecdotal accounts refer to a localized fishery for bull trout/Dolly Varden between Whitepine and Berne. Electrofishing sampling in 1989 yielded a 508 mm fluvial\adfluvial fish in lower Mill Creek.

The Nason Creek basin was surveyed extensively (six surveys in mainstem Nason Creek, four in Mill Creek, one in Smith Brook Creek, one in Lanham Creek, and three in Whitepine Creek) in 1989 to define the distribution of bull trout/Dolly Varden. All bull trout/Dolly Varden were found in Mill Creek, but the reach from the falls to Mill Creek should be surveyed more thoroughly. Redd counts were made in 1989 and 1990, but high flows hampered the 1990 count. Data quality is excellent for presence/absence sampling but poor for redd counts.

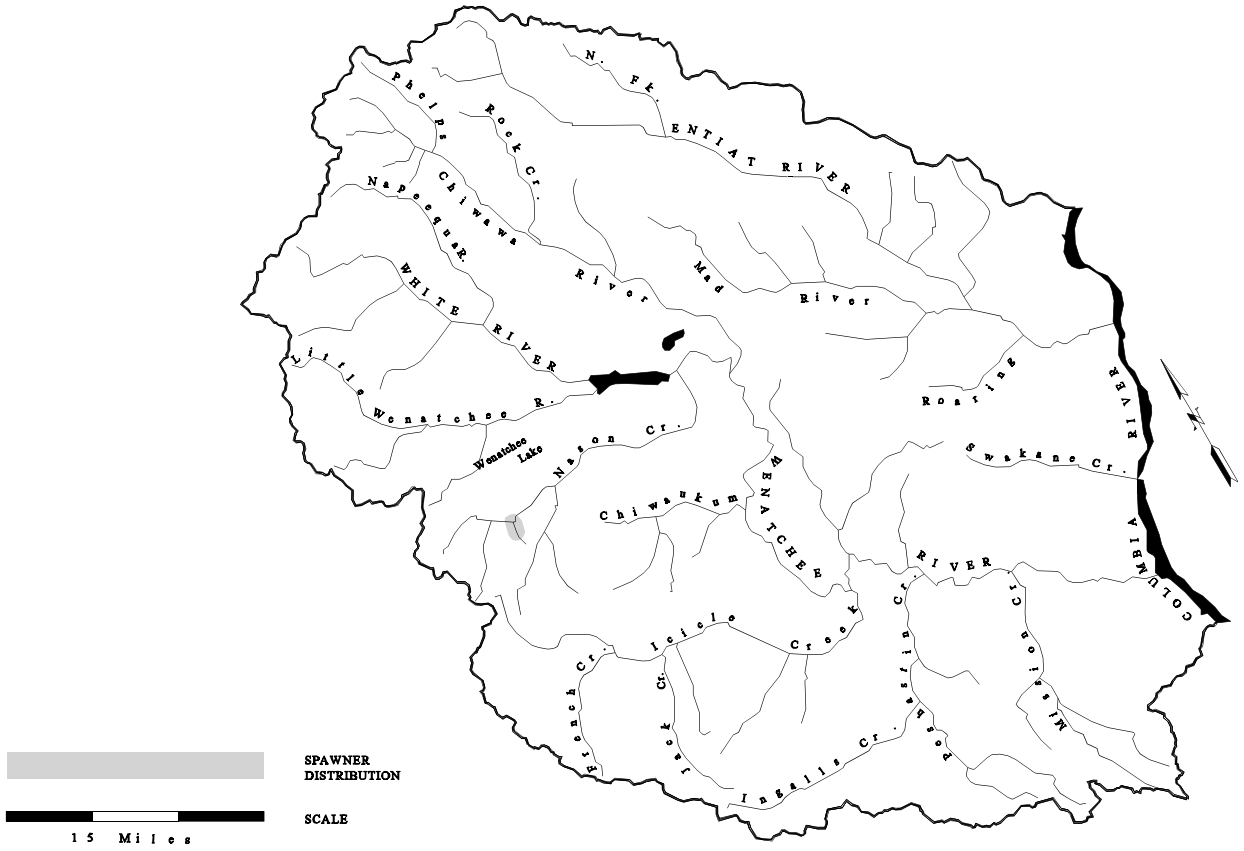
FACTORS AFFECTING PRODUCTION

Habitat--Nason Creek is a third-order stream measuring 26.5 miles in length and draining a basin of 108 square miles. The basin is the lowest-elevation portion of the Cascade Mountains and receives less precipitation than higher areas to the north and south. The lower elevation and open topography cause early snow melt and low flow with elevated temperatures in July and August. The gradient between Whitepine and Mill Creeks is 1.8%, and elevation ranges from 2,310 to 2,790 feet. Unlike most bull trout/Dolly Varden spawning habitat in the eastern Cascades, which is generally found on U.S. Forest Service land, portions of Nason Creek are privately owned. Bull trout/Dolly Varden habitat in Nason Creek lies within a major transportation corridor containing U.S. Highway 2 and a Burlington Northern railroad line. In places, railroad riprap extends into the channel. Much of the railroad right-of-way has been repeatedly burned by fires set by locomotives. Nevertheless, past abuses to the habitat have healed over time.

STOCK DEFINITION PROFILE for Nason Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

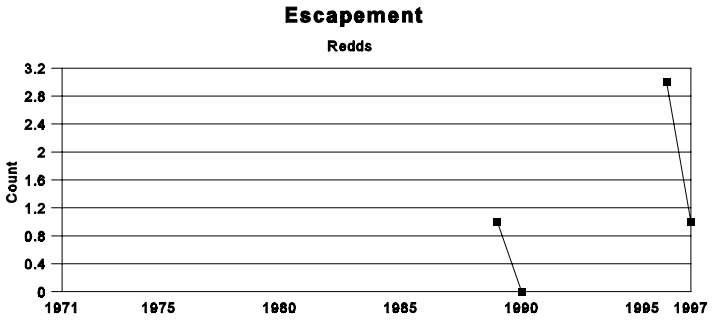
DISTINCT? - Unknown

STOCK STATUS PROFILE for Nason Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Poor

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	1			
90	0			
91				
92				
93				
94				
95				
96	3			
97	1			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

In fact, because of its high-quality habitat, the U.S. Fish and Wildlife Service selected lower Nason Creek as a site for holding translocated steelhead and chinook salmon from the Columbia River between 1939 and 1944.

Lower Mill Creek seems to be the primary spawning area for this stock. This part of the stream is small and flat with a substrate of sands and gravels in contrast to the typically larger, more torrential streams with boulder bottoms.

Harvest Management--Nason Creek and its tributaries are closed to bull trout/Dolly Varden harvesting. Most of Nason Creek is managed under selective fishery regulations (no bait is allowed) for other species, but use of bait is permitted in Mill Creek. This regulation and ultra-easy access may reduce bull trout/Dolly Varden abundance. The potential for poaching of pre-spawners below Gaynor Falls and spawners in Mill Creek is high, given the historical awareness of bull trout/Dolly Varden presence and easy access to the creek. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in Lake Wenatchee and Columbia River as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Upper Nason Creek was stocked from 1933 until 1990, when the last catchable-size rainbow trout were released. Rainbow and cutthroat trout were the most common species stocked. Kokanee and eastern brook trout were stocked occasionally. Rainbow fry releases were replaced by catchable rainbows in 1950. Most fish were released below the falls. Rainbow trout were released into Mill Creek in 1934 and 1948, but they are not found there today because the water is too cold. Cutthroat trout were released into Mill and Smith Brook creeks, and self-sustaining populations exist in both creeks today. Brook trout were released below the falls and in Whitepine Creek, but these introductions were unsuccessful.

Though multiple species have been stocked over several decades, only cutthroat trout have been established above the falls. Cutthroat trout do not adversely affect bull trout/Dolly Varden.

Species Interactions--Gaynor Falls (RM 16.8) seems to block rainbow trout and anadromous species but not migratory bull trout/Dolly Varden. This apparent impasse may actually be thermal rather than physical, since bull trout/Dolly Varden are not obstructed. Because cold water habitat above the falls is limited, and rainbow trout may replace bull trout/Dolly Varden given the thermal opportunity, this stock is at risk of extinction if the falls proves passable and the climate warms. If Gaynor Falls is and remains a barrier to rainbow trout but not to bull trout/Dolly Varden, then climate warming poses little threat.

WENATCHEE -- LITTLE WENATCHEE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Little Wenatchee bull trout/Dolly Varden have been tentatively identified as a distinct stock based on their geographic distribution. Anecdotal accounts indicated a popular bull trout/Dolly Varden fishery for native adfluvial fish just below the barrier falls (RM 7.8) in the past. Spawning occurs immediately below the falls, isolating this stock from others. Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown. Trend data are needed to establish the stock status. No bull trout/Dolly Varden have been reported (seven electrofishing surveys were conducted in three tributaries in 1989) above the falls by WDFW personnel. Only juveniles have been found below the falls. A snorkel survey in August, 1989 located no bull trout/Dolly Varden in a two-mile reach from the falls to Hidden Creek. Bull trout/Dolly Varden were not observed in a 1997 WDFW hook-and-line survey conducted from the falls to 0.4 miles below Hidden Creek. Spawners have not been observed since 1984, though surveys are not routine. This stock may be extinct; more information is required. Data quality is good, but data are limited.

FACTORS AFFECTING PRODUCTION

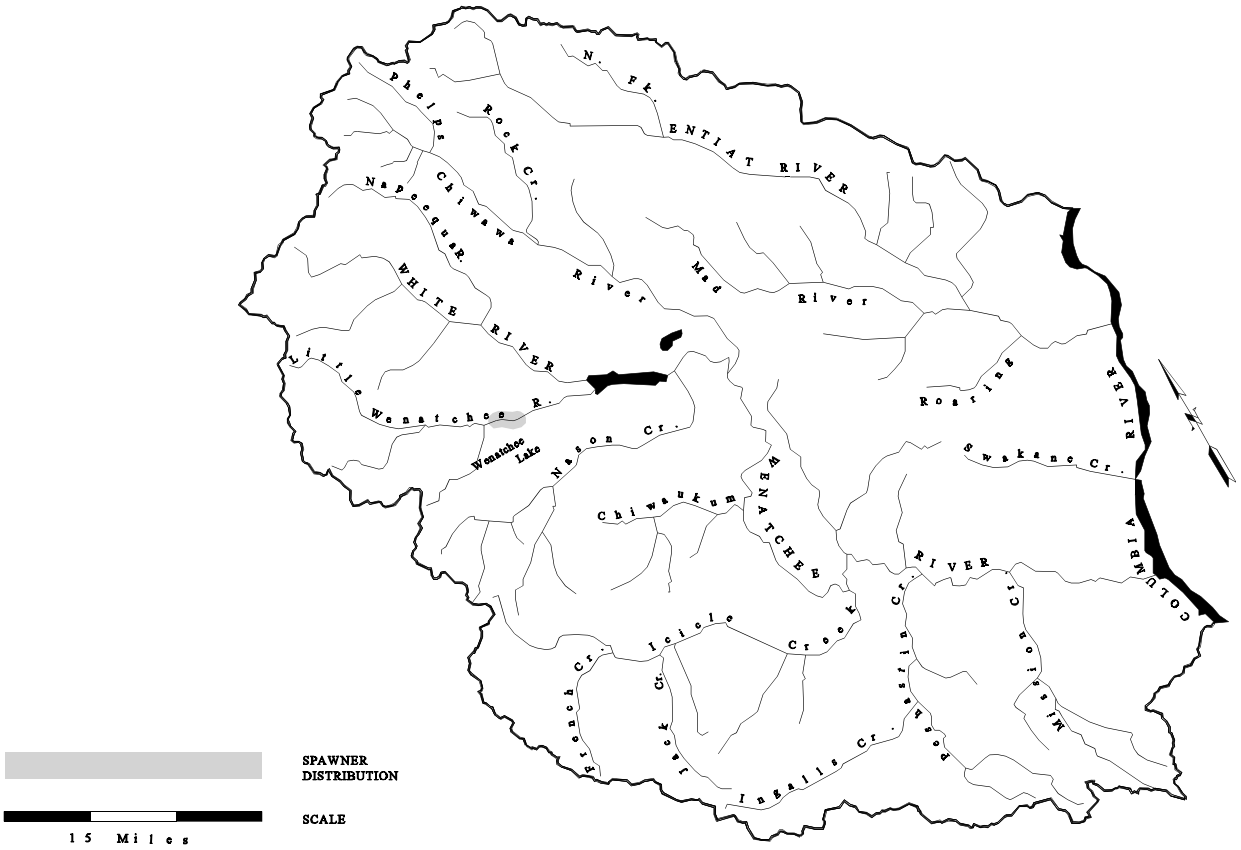
Habitat--The Little Wenatchee River is a third-order river that is 22.7 miles long and drains a basin of 100 square miles. This basin and the Nason Creek basin drain the lowest-elevation portion of the Cascade Mountains within the Wenatchee River drainage. The elevation at the upstream limit of distribution (the falls) is low (2,040 feet). Precipitation is less, and snow melts earlier than in higher-elevation basins, resulting in lower minimum flows and higher stream temperatures during July and August. The basin contains 13 lakes (which tend to have relatively warm water) but no glaciers to cool the water. Water temperature is marginally high for bull trout/Dolly Varden. Minimum flow at the mouth is 60 cfs. The gradient between the mouth and the falls is 0.4%. Spawning habitat is on U.S. Forest Service land; only the flats near Lake Wenatchee are privately owned. Human activity has been minor, and habitat for bull trout/Dolly Varden remains essentially pristine. The area below the falls has limited organic cover and undercut banks. The gradient between RM 7.4 and RM 7.8 (the falls) is 3.3%.

Harvest Management--Bull trout/Dolly Varden are protected from harvest in the Little Wenatchee, and selective fishery regulations (bait is not allowed) for other species are in place from just above the falls downstream to the mouth. Local anglers, aware

STOCK DEFINITION PROFILE for Little Wenatchee Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Little Wenatchee Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	FW PROD Snorkel			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	0			
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

of the bull trout/Dolly Varden spawners below the falls and with easy access from Riverside Campground, may have overharvested them. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly in the Wenatchee and Columbia rivers as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--The Little Wenatchee River has a long history of fish stocking. Cutthroat and rainbow trout fry, especially the latter, were stocked annually from 1933 until 1949. Though both species became established above the falls, effects on bull trout/Dolly Varden were not deleterious. Cutthroat trout and bull trout/Dolly Varden are ecologically compatible.

After 1949, catchable-size rainbow trout plants became the rule until 1996, when the program ceased. The catchable program resulted in intense fisheries that undoubtedly increased harvest of bull trout/Dolly Varden, especially during the many years when bait was allowed, and harvesting bull trout/Dolly Varden was legal. Negative effects on bull trout/Dolly Varden may have resulted from high stocking densities of rainbow trout catchables released just above the falls.

Brook trout were stocked in 1949 and again in 1957. They are now abundant above and below the falls and undoubtedly will eliminate bull trout/Dolly Varden if they have not already done so.

Species Interactions--Historically, this stock probably ebbed and flowed into and out of extinction naturally in concert with climatic warming and cooling. When the climate warmed and the falls blocked access to coldwater upstream, the river offered no suitable habitat and bull trout/Dolly Varden probably disappeared, replaced by rainbow trout, mountain whitefish, and chinook and sockeye salmon. In cooler periods water temperature favored bull trout/Dolly Varden, and strays from nearby stocks probably recolonized the water. Currently the climate does not favor bull trout/Dolly Varden. Brook trout are abundant below the falls and will eventually extirpate bull trout/Dolly Varden if they have not already done so.

WENATCHEE -- WHITE (WENATCHEE) BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This is a native stock of adfluvial (Lake Wenatchee) and perhaps fluvial fish (White River) that is geographically isolated from other species when spawning. The elevation at White River falls (RM 14.3), the upper end of bull trout/Dolly Varden distribution, is too low (2,160 feet) to support the resident life history form, which requires colder water. Spawning occurs from the Napeequa River to the falls from mid-September through mid-October.

STOCK STATUS

Stock status is Unknown. In 1984 four redds were observed on a single survey from Grasshopper Meadows to the base of the falls. Every year some spawning occurs just below Panther Creek on the west side of the island at Grasshopper Meadows. The turbidity of the water in the river is so great from glacial flour that counting redds is impractical. Data quality is poor.

FACTORS AFFECTING PRODUCTION

Habitat--The White River is a fourth-order stream that is 26.7 miles long and drains 150 square miles. The basin contains 13 glaciers. At RM 6.4 mean basin elevation is 4,590 feet, and minimum flow in September is 34 cfs versus 83 cfs in January. The gradient from the Napeequa River confluence to the falls is 1.4%, and elevation ranges from 1,935 to 2,160 feet. Ninety-seven percent of the White River is located on U.S. Forest Service land, of which 61% is in wilderness. About six percent of the basin has been logged.

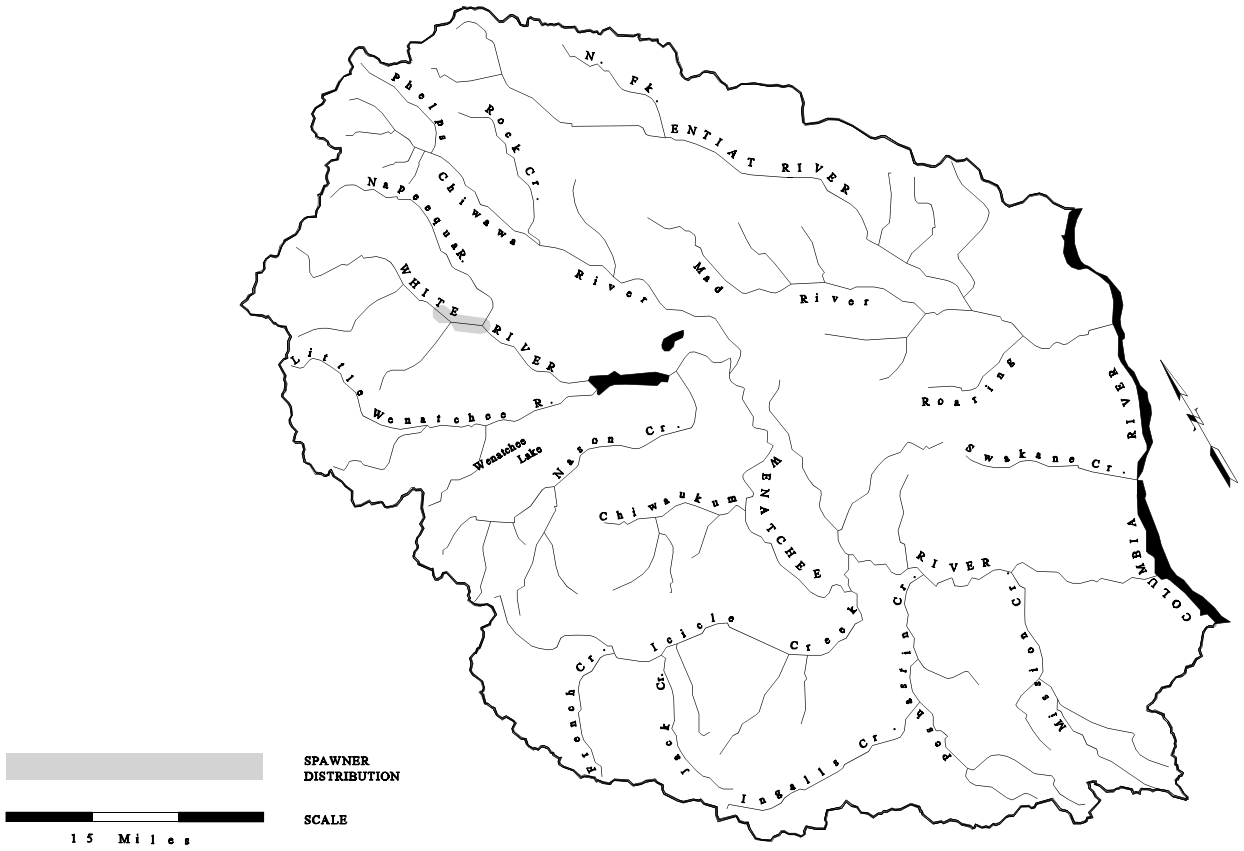
Alterations resulting from human activity have been minor, and habitat for bull trout/Dolly Varden remains essentially pristine. Water temperature is lower than might be expected for a given elevation because the river originates as glacial meltwater, but elevation at the falls is low enough that water temperature is marginally warm for bull trout/Dolly Varden. On August 7, 1989 the White River was 15.6° C at the falls, which is too warm for bull trout/Dolly Varden spawning and early rearing.

Harvest Management--Bull trout/Dolly Varden are protected from harvest, and selective fishery regulations (bait is not allowed) for other species are in force in the White River. Though access to the river is good, its size, turbidity and swiftness discourage fishing. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline significantly downriver in Lake Wenatchee as a result of the closure of the recreational steelhead fishery. This closure is associated with the listing of upper

STOCK DEFINITION PROFILE for White (Wenatchee) Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Fluvial Spawning									■	■			No
Adfluvial Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for White (Wenatchee) Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Poor

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84	4			
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--The White River has a long history of fish stocking dating back to 1933. Rainbow trout and cutthroat trout fry were stocked most frequently but occasional releases of kokanee and steelhead fry also occurred until 1965. Brook trout were released a few times into sloughs and beaver ponds and undoubtedly some gained access to the White River. Though brook trout are not common in the White River, a few have been discovered in Canyon Creek, where they have not been stocked. Introduced species have not changed the distribution of native salmonids below the falls and, therefore, have not significantly affected bull trout/Dolly Varden.

A more significant threat to bull trout/Dolly Varden occurred from 1965 until 1990, when releases of catchable-size rainbow trout created substantial fisheries that increased harvest of bull trout/Dolly Varden. In 1990, fish stocking ceased.

Species Interactions--Rainbow trout and chinook and sockeye salmon are abundant in the White River below the falls and may be replacing bull trout/Dolly Varden there now because they have a thermal advantage.

WENATCHEE -- PANTHER CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Panther Creek bull trout/Dolly Varden are native and are considered a distinct stock based on the geographic distribution of their spawning grounds. Spawning occurs in Panther Creek from the mouth to the barrier falls at RM 0.7 from early September through mid-October. The stock consists of adfluvial (Lake Wenatchee) and perhaps fluvial (White River) life history forms. The falls at RM 0.7 blocks bull trout/Dolly Varden migration into upstream reaches where temperatures are cold enough for the resident life history form.

STOCK STATUS

Stock status is Healthy. Trend data are based on redd counts which began in 1983. The entire spawning reach is surveyed. Counts before 1987 were incomplete. Since 1988, counts have been complete except for 1990, when flooding precluded some surveys. The trend is stable despite high annual variation. Data quality is excellent.

FACTORS AFFECTING PRODUCTION

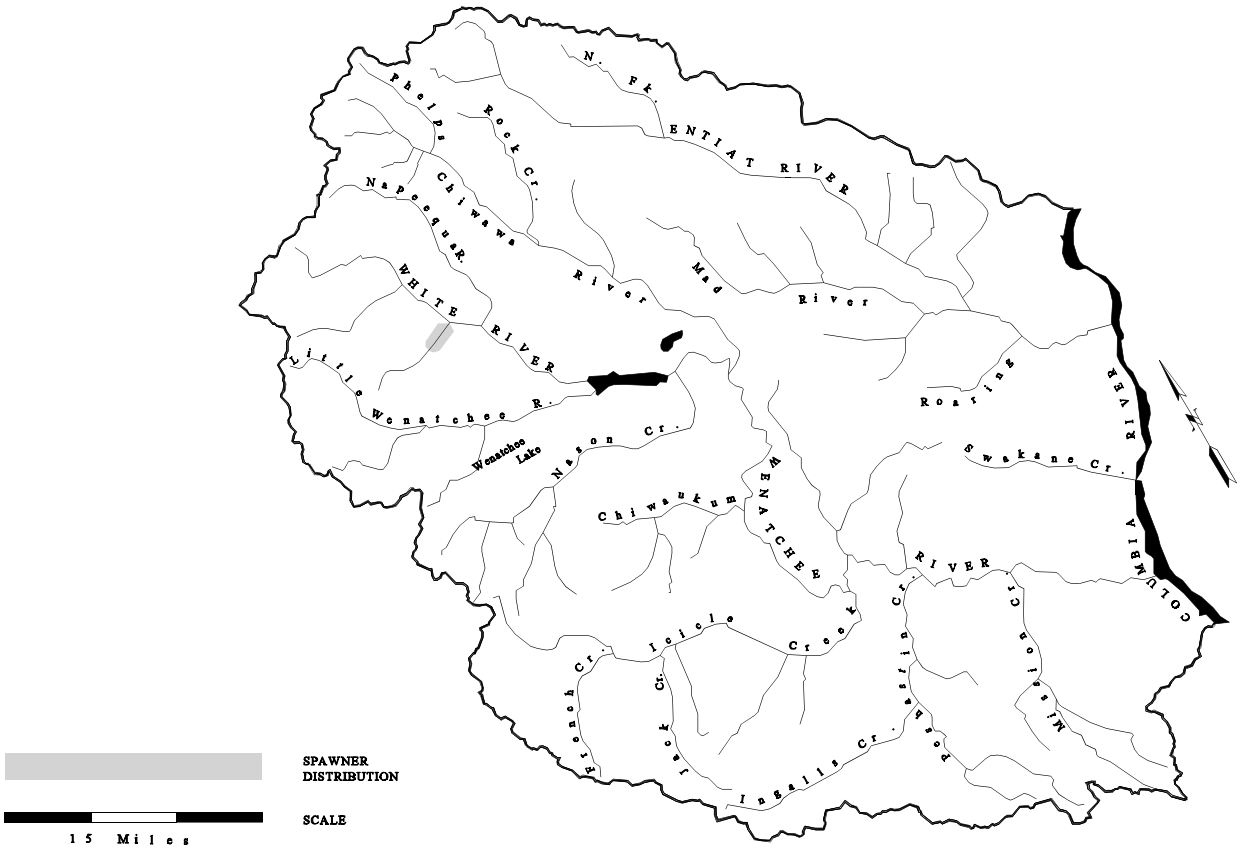
Habitat--The habitat is unaffected by human activity and, with the exception of warm water temperature, is prime for bull trout/Dolly Varden. The initial 0.4 mile is of moderate gradient, and gravel and cobbles are relatively abundant. Runs and riffles far outnumber pools. Bull trout/Dolly Varden spawn heavily in this reach, especially in the upper section. Upstream, the gradient steepens, and the creek climbs one plunge pool after another among huge boulders. The overall gradient is 5.1%, and elevation ranges from 2,010 to 2,200 feet. Gravel is patchy and spawning is less dense. Though the basin is heavily forested, riparian vegetation is poorly developed, and large woody debris is almost absent. Nearly the entire basin is located on U.S. Forest Service land in the Glacier Peak Wilderness.

Harvest Management--Panther Creek is closed to all fishing. Poaching of spawners has occurred in the past, but seems to have declined after the recent total fishing closure. Hooking mortality and illegal harvest of bull trout/Dolly Varden in Lake Wenatchee are expected to decline significantly as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the federal Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for Panther Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

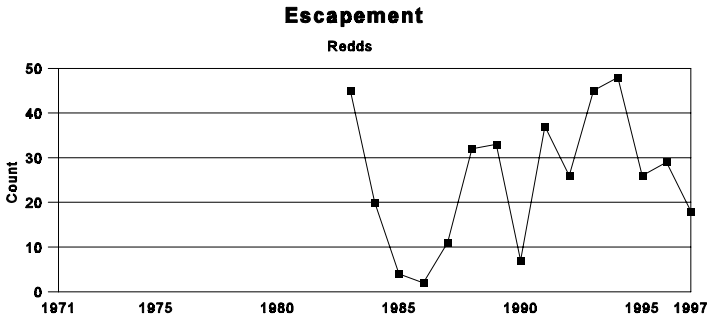
DISTINCT? - Unknown

STOCK STATUS PROFILE for Panther Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	45			
84	20			
85	4			
86	2			
87	11			
88	32			
89	33			
90	7			
91	37			
92	26			
93	45			
94	48			
95	26			
96	29			
97	18			



The 1990 survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

Hatchery--Rainbow trout fry were released four times into Panther Creek between 1937 and 1946. A very low number of rainbow trout are found today, and they probably are native rainbow trout recruited from the White River rather than descendants from hatchery-origin fish. Consequently, we believe that hatchery-origin plants have had no effect on bull trout/Dolly Varden in Panther Creek.

Species Interactions--A small population of rainbow trout is found in Panther Creek, and chinook salmon occasionally spawn in lower Panther Creek. Rainbow trout may eventually dominate bull trout/Dolly Varden in Panther Creek because the water temperature is relatively warm due to low elevation, and the falls prevents bull trout/Dolly Varden from reaching cold water upstream. This creek likely is at the threshold of a rainbow trout takeover, though the outcome may not be manifested for many years.

OVERVIEW -- ENTIAT BULL TROUT/DOLLY VARDEN

ENTIAT
MAD RIVER

STOCK DEFINITION AND ORIGIN

Currently two bull trout/Dolly Varden stocks have been identified in the Entiat River Watershed. They are the Entiat River and Mad River stocks. The two stocks are isolated from one another because the water temperature between them is too warm for bull trout/Dolly Varden.

The bull trout/Dolly Varden in the Entiat River watershed are native. No hatchery introductions of bull trout/Dolly Varden have occurred.

STOCK STATUS

The Entiat River bull trout/Dolly Varden stock has been classified as Unknown while the Mad River stock has been classified as Healthy based on the trend of available abundance data.

Suitable spawning habitat is currently used by bull trout/Dolly Varden, and present spawning distribution is the same as the distribution prior to European settlement. Habitat is naturally limited because adequately cold water is limited and found in high gradient, headwater reaches where access and flow are limited.

Habitat quantity ebbs and flows with climate, precipitation, forestation changes. The worse scenario is a warming, drying climate where the forest is removed (e.g., wildfire, disease/parasite, logging, etc.).

ENTIAT -- ENTIAT BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Whether spawners below Entiat Falls (RM 29.2) in 1994 constitute a stock or are strays from other Columbia River tributaries that elected to spawn when confronted with the falls is unknown. Straying could result from Columbia River dams blocking migration of fish to upriver natal streams. Further, that rainbow trout and chinook salmon are abundant in the Entiat River up to Entiat Falls, casts doubt on the thermal suitability of the habitat for bull trout/Dolly Varden. Nevertheless, a distinct stock that is geographically and thermally isolated is assumed. Only fluvial fish are present. The barrier falls precludes distribution to water cold enough to support the resident life history form. The lower spawning boundary is not precisely known, but it undoubtedly occurs within one mile of the Entiat Falls. Spawn timing is from mid-September through mid-October.

STOCK STATUS

Stock status is Unknown. Redd counts are limited to 1994 and 1995 and one location (the gaging station pool below the falls). Presence/absence data are based on seven standing crop surveys conducted throughout the river below Entiat Falls in 1984 and six snorkel surveys in 1987 by the USFWS. A total of seven juvenile bull trout/Dolly Varden were counted in these surveys, but the origin (Mad River versus Entiat River) of these fish is unknown. Data quality is poor for population size trend information, but good for presence/absence data.

FACTORS AFFECTING PRODUCTION

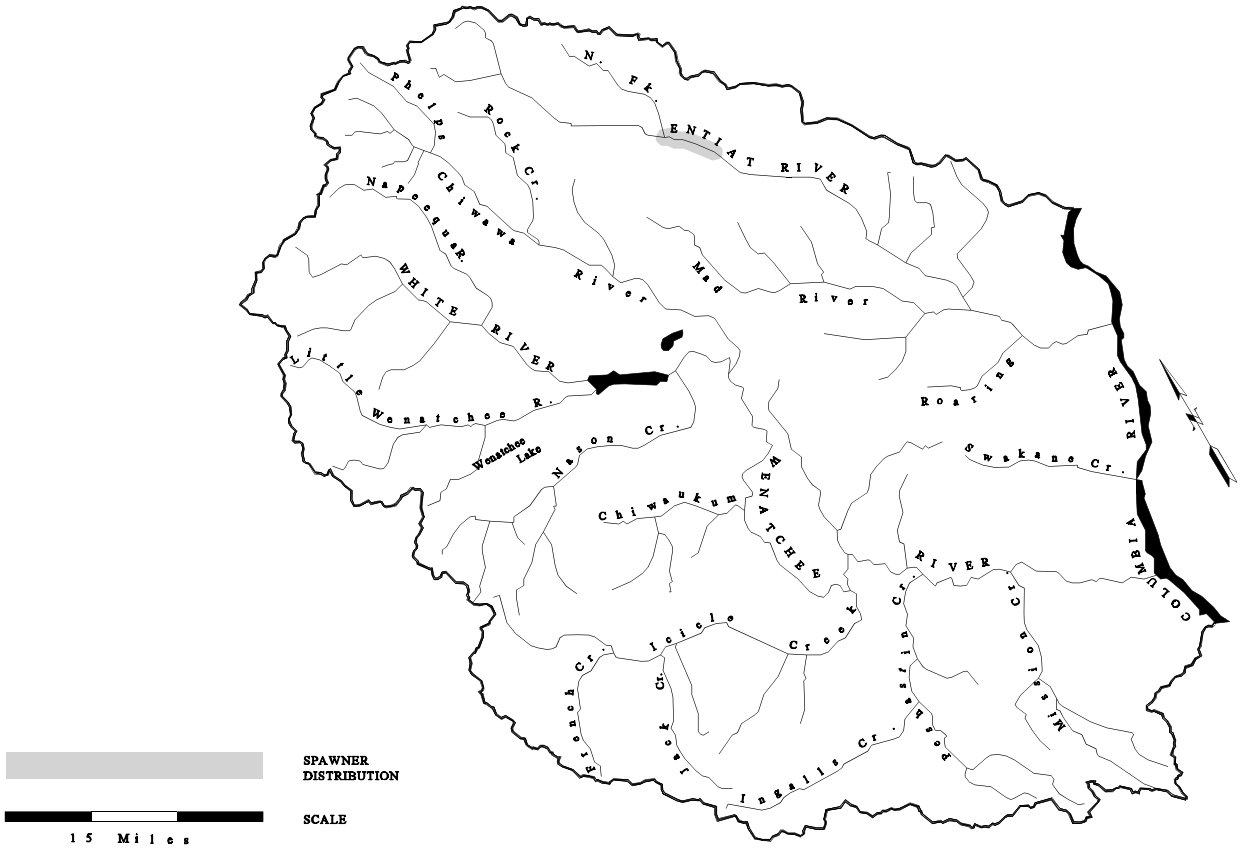
Habitat--The Entiat River is 53.4 miles long and is a fourth-order river. At RM 18.1 the basin area is 203 square miles, and basin elevation is 5,230 feet. From RM 28.2 to Entiat Falls (RM 29.2), the presumed spawning reach, the gradient is 2.5%, and elevations range from 2,510 to 2,640 feet. Minimum flow at RM 30.5 is 63 cfs. The breeding and initial rearing zone of bull trout/Dolly Varden is on U.S. Forest Service land, but most of the middle and lower river courses through private property.

The watershed in the vicinity of the bull trout/Dolly Varden zone is little altered by human activity, owing to its mountainous nature. Some water withdrawal for irrigation occurs in the lower river, but the depletion rate is less than 10%. The watershed is naturally vulnerable to wildfire, and 62% of the basin has been scorched by catastrophic fires in 1970, 1976, and 1988. In the lower basin, the absence of ground-stabilizing vegetation after the fires caused major erosion and flooding following heavy rain.

STOCK DEFINITION PROFILE for Entiat Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Fluvial Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Entiat Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Poor

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94	3			
95	3			
96	0			
97	0			

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Below RM 15.0, the gradient drops below 0.3%, the basin acts as a catchment for materials originating upstream, and the river meanders as a riffle on its broadest floodplain. Above RM 15.0 to the falls, the gradient increases (2.3% average), pools appear, and cobbles and boulders dominate the substrate. Large woody debris is rare throughout the river course.

The low elevation and presence of rainbow trout and chinook salmon suggest that water temperature may be too warm for bull trout/Dolly Varden spawning and initial rearing. Conversely, the Entiat River drains high-elevation, deeply-incised topography containing 11 glaciers, which may counter the warming effects of low elevation. However, on August 29, 1989 the maximum temperature at the falls was 14° C, only marginally cold enough for bull trout/Dolly Varden at that time of year (maximum annual water temperature occurs in late July or early August).

The Columbia River's conversion from river to reservoir has decreased its capacity to rear bull trout/Dolly Varden, and dams kill some downstream migrants and impede upstream migration.

Harvest Management--The Entiat River is closed to the taking of bull trout/Dolly Varden. Hooking mortality and illegal harvest may become significant in the summer trout fishery. Hooking mortality and illegal harvest of bull trout/Dolly Varden in the Entiat and Columbia rivers are expected to decline significantly as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the federal Endangered Species Act in August, 1997.

Hatchery--Annual fish stocking began in 1933 and continued unabated until 1996, when trout stocking stopped. Brook trout and rainbow, cutthroat, and steelhead trout were commonly stocked in the 1930s and 1940s, after which catchable-sized rainbows and steelhead became the rule. Heavy stocking densities and intense fisheries in bull trout/Dolly Varden breeding habitat undoubtedly resulted in overharvesting and perhaps in negative interactions between native fish and hatchery-origin fish.

Brook trout are established above the falls. It is unclear whether the 12 parr observed in a two-mile snorkel survey below the falls on August 29,1989 were produced above or below the falls. Their presence poses grave hybridization risks for bull trout/Dolly Varden.

Species Interactions--The isolation that bull trout/Dolly Varden require during spawning and initial rearing is being lost, since rainbow trout and chinook salmon are found in good numbers to the base of the falls. Blocked from cold water sources above the falls, bull trout/Dolly Varden are being replaced by trout and salmon with higher temperature preferences.

ENTIAT -- MAD RIVER BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Mad River bull trout/Dolly Varden are native and have been identified as a distinct stock based on geographic and thermal isolation of spawning and initial juvenile rearing areas. Fluvial fish spawn between Young Creek (RM 11.2) and Jimmy Creek (RM 18.9). Occasionally, fluvial fish may spawn in Tillicum Creek. Resident fish may exist in the Mad River above Jimmy Creek and in Cougar and Tillicum creeks. A bull trout/Dolly Varden has been reported in Mad Lake, but this apparently is not an adfuvial fish but a resident fish that migrated into the lake. Spawn timing is from mid-September through mid-October.

STOCK STATUS

Status is Healthy. Redds have been enumerated annually between Young Creek (RM 11.2) and Jimmy Creek (RM 18.9) since 1989. The annual variation in redd counts is high, but the trend is stable. Data quality is good.

FACTORS AFFECTING PRODUCTION

Habitat--The Mad River is a third-order stream that is 24.5 miles long. The basin area is 94 square miles. The basin has no glaciers and originates from Mad Lake (5,800 feet elevation). Known spawning occurs from RM 11.2 to 18.9, where the gradient is 4.1%, and elevation ranges from 2,900 to 4,560 feet. Minimum flow is 17 cfs at the river mouth. All of the Mad River is on U.S. Forest Service land.

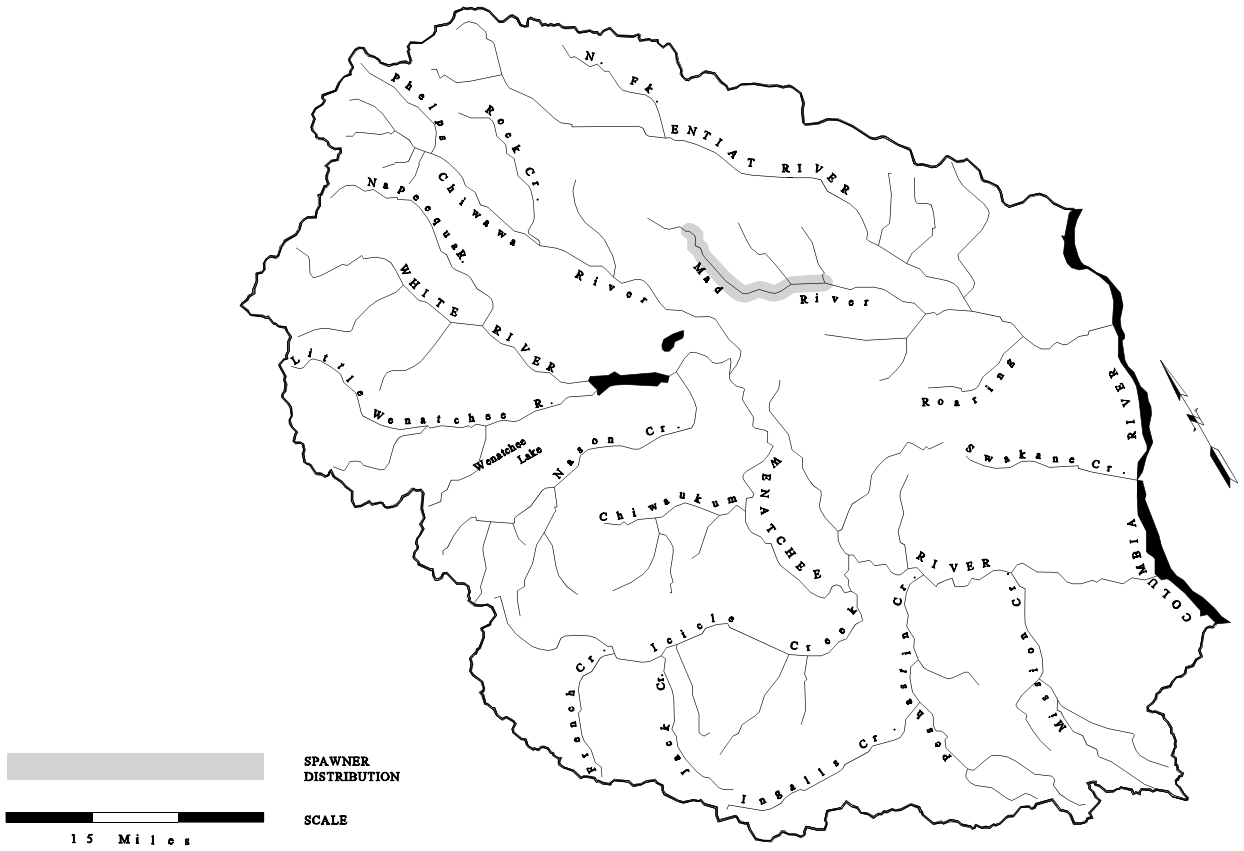
Habitat diversity is low; riffles and large rock predominate. Spawning gravel and large woody debris are limited. The watershed is naturally vulnerable to wildfire and was scorched in the 1880s. It had returned to pristine condition until the 1994 Tyee Fire. Though the Tyee Fire was generally of low burn intensity along the Mad River, fire suppression tree cutting, done in an attempt to prevent the fire from escaping to the south side of the Mad River, may have compromised existing large woody debris and future recruitment.

Harvest Management--The Mad River is closed to all fishing from the mouth to Jimmy Creek, but some illegal fishing persists. Hooking mortality and illegal harvest of bull trout/Dolly Varden in the Entiat and Columbia rivers are expected to decline significantly as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the federal Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for Mad River Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

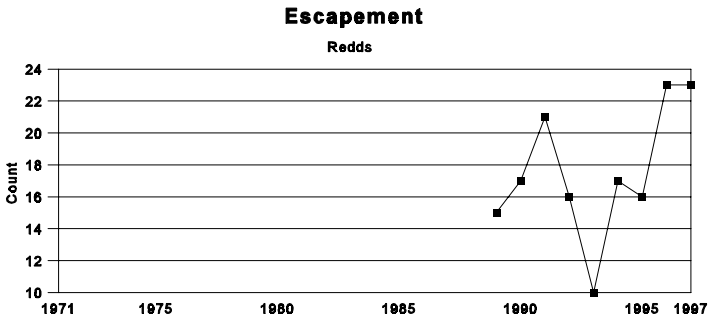
DISTINCT? - Unknown

STOCK STATUS PROFILE for Mad River Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	15			
90	17			
91	21			
92	16			
93	10			
94	17			
95	16			
96	23			
97	23			



AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

Hatchery--Cutthroat and rainbow trout fry were stocked first in 1934 and annually thereafter until 1990, when stocking ceased. Small fry up to subcatchable-size were planted until 1964, when the catchable-sized rainbow trout program commenced. The resulting fishery was popular and increased the harvest of migrant bull trout/Dolly Varden. Because catchable trout were released far below the spawning and initial rearing zones, harvest and negative interactions with bull trout/Dolly Varden were minimized.

Tillicum Creek was stocked with brook trout in 1973. Apparently this introduction failed, as no brook trout are found there today.

Species Interactions--Low water temperature now favors bull trout/Dolly Varden over rainbow trout in the vicinity of Cougar Creek, and most spawning occurs upstream of this point. Invasion of rainbow trout could occur if water temperature warms over the long-term, but a minimum of five miles of suitable bull trout/Dolly Varden spawning habitat offers more thermal buffering than found in most streams. On the other hand, the upper river may be vulnerable to warming because Mad Lake, the origin of Mad River has high exposure to sunlight.

OVERVIEW -- METHOW RIVER BULL TROUT/DOLLY VARDEN

GOLD CREEK
BEAVER CREEK
TWISP
EAST FORK BUTTERMILK CREEK
WEST FORK BUTTERMILK CREEK
REYNOLDS CREEK
LAKE CREEK
WOLF CREEK
GOAT CREEK
EARLY WINTERS CREEK
CEDAR CREEK
LOST RIVER
MONUMENT CREEK
COUGAR LAKE
FIRST HIDDEN LAKE
MIDDLE HIDDEN LAKE
WEST FORK METHOW

STOCK DEFINITION AND ORIGIN

Currently 17 bull trout/Dolly Varden stocks have been identified in the Methow River watershed. They are the Gold Creek, Beaver Creek, Twisp River, East Fork Buttermilk Creek, West Fork Buttermilk Creek, Reynolds Creek, Lake Creek, Wolf Creek, Goat Creek, Early Winters Creek, Cedar Creek, Lost River, Monument Creek, Cougar Lake, First Hidden Lake, Middle Hidden Lake, and the West Fork Methow River stocks. Adfluvial, fluvial and resident life history forms are present.

The bull trout/Dolly Varden in the Methow River watershed are native. No hatchery introduction of bull trout/Dolly Varden has occurred.

Bull trout/Dolly Varden spawn, and alevins rear in cold, headwater reaches where annual heat budgets are less than 1600° C, the upper limit of steelhead and chinook salmon distribution. The stocks spawn in thermal isolation, because water temperature is too warm downstream between spawning sites.

Adfluvial, fluvial and resident forms are present. In addition to genetics, the environment plays a role in determining life form. The resident form is found in the coldest reaches or above passage barriers. Below such barriers in warmer, richer water resident emigrants likely transform into the fluvial form, which are forced to spawn in unsuitable habitat below barriers. Some resident fish enter Cougar Lake and First and Middle Hidden Lakes and become adfluvial fish.

STOCK STATUS

The status of bull trout/Dolly Varden stocks in the Methow River watershed has been classified as Unknown with the exception of the Lost River stock which has been classified as Healthy based on the trend of available abundance data. The stock in the

South Fork of Beaver Creek was extirpated by brook trout introgression. This also probably occurred in Eightmile Creek.

Nearly all suitable spawning habitat is currently used by bull trout/Dolly Varden and present spawning distribution is nearly the same as the distribution prior to European settlement. This habitat is naturally limited (less than 5% of the subbasin total) because adequately cold water is limited and found in high gradient, headwater reaches where access and flow are limited.

Habitat quantity ebbs and flows with climate, precipitation, forestation changes. The worst scenario is a warming, drying climate where the forest is removed (e.g., wildfire, disease/parasite, logging, etc.).

METHOW -- GOLD CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The existence of a stock in the Gold Creek basin is speculative in that no adults or young-of-the-year fry have been found. The assumption of a stock is based on the collection of three parr, which may be emigrants from a distant basin. Only juvenile fish have been sampled to date, making it impossible to identify their life history form. Because barrier falls bar access to the coldest water where the resident life history form is usually found, we assume that bull trout/Dolly Varden in this basin are the fluvial. Spawning would occur within 0.5 mile of the falls on Foggy Dew and Crater Creeks. Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown but may be Critical or Extinct. Six standing crop estimates were made in likely bull trout/Dolly Varden reaches during 1987 and 1988. Test fishing efforts using hook and line were conducted once in 1975 and six times in 1990. Only three bull trout/Dolly Varden have ever been captured. Red surveys were initiated in Crater Creek in 1996. Very low numbers of redds have been observed. Data quality is good for presence/absence and redd survey data but poor for test fish data.

FACTORS AFFECTING PRODUCTION

Habitat--The base of the falls on Crater Creek (3,800 feet elevation) and Foggy Dew Creek (3,840 feet elevation) are the most likely areas for bull trout/Dolly Varden in the Gold Creek basin. Both of these streams are second-order streams that are less than ten miles long with base flows under 5 cfs. All but lower Gold Creek is in the Okanogan National Forest.

Gold Creek may be too warm for bull trout/Dolly Varden. Impassable falls preclude them from accessing colder water reaches above the falls. Aside from the warm water, habitat is not a factor in the status of bull trout/Dolly Varden, as it remains pristine in the headwaters of Foggy Dew and Crater creeks, both of which are boulder-filled torrential streams limited in gravel and large woody debris.

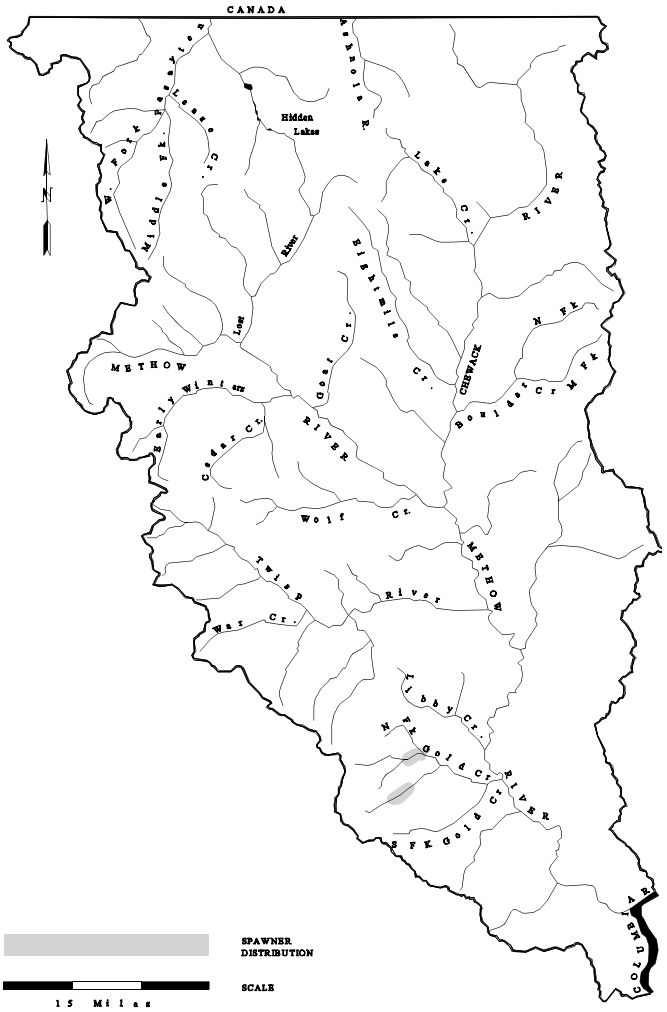
Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of some fluvial fish.

Harvest Management--Fishing effort is low in the bull trout/Dolly Varden zones (where hiking is required) but moderate in the lower basin (below Foggy Dew Creek), where selective fishing regulations protect bull trout/Dolly Varden. Hooking mortality and

STOCK DEFINITION PROFILE for Gold Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Gold Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD No./100m^2	FW PROD Fish/Hr	ESCAPE Redds	
73				
74				
75		1		
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	.5			
88				
89				
90				
91				
92				
93				
94				
95				
96			2	
97			1	

The 1996 redd survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

illegal harvest of bull trout/Dolly Varden in the Methow and Columbia rivers are expected to decline significantly as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the federal Endangered Species Act in August, 1997.

Hatchery--Rainbow trout fry releases in Gold, Crater, and Foggy Dew creeks started in the 1940s. In the 1950s, catchable-size rainbow trout stocking sustained trout fisheries in lower Gold Creek, and incidental catch of bull trout/Dolly Varden rose. Heavy rainbow trout stocking rates may have negatively affected bull trout/Dolly Varden parr. The catchable rainbow program was discontinued in the mid-1970s and likely had no lasting effects on bull trout/Dolly Varden because hatchery-origin fish were released below the bull trout/Dolly Varden zones into native rainbow trout populations that were probably already replacing bull trout/Dolly Varden naturally.

Rainbow trout became established in Crater Creek from an introduction made into Crater Lake. Recruits from this population, protected from bull trout/Dolly Varden by the falls, may have put added pressure on bull trout/Dolly Varden in Crater Creek. Only cutthroat trout (released in 1917 in Cooney Lake, the source of Foggy Dew Creek) are found above Foggy Dew Falls, and they have no effect on the status of bull trout/Dolly Varden in that stream.

Species Interactions--Thermal conditions in this basin are marginal for bull trout/Dolly Varden and favor rainbow trout, which predominate in coldest water accessible to bull trout/Dolly Varden. Bull trout/Dolly Varden may now be extinct in Gold Creek, the natural result of habitat favoring rainbows. Bull trout/Dolly Varden are sustainable in this basin under present thermal conditions only if they are established above the falls where rainbow trout are not found.

METHOW -- BEAVER CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Historically, distinct stocks of native bull trout/Dolly Varden were found in the South Fork of Beaver Creek and Blue Buck Creek. The stock in the South Fork is now extinct, and the one in Blue Buck Creek is nearly so. Distinct stocks probably existed in the Middle Fork and Lightning creeks as well, though this is speculation based on available habitat. Stocks were spatially separated in headwater reaches and probably consisted of both fluvial and resident life history forms. Distribution of the Blue Buck stock is centered between RM 1.5 (elevation 4,600 feet) and RM 2.0 (elevation 4,800 feet). Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown, however the limited information indicates the stock may be Critical. More information is needed to confirm the status of this stock.

Excellent-quality standing-crop estimates were conducted in the late 1980s (Ken Williams, WDFW, personal communication) in the Middle Fork (two sites) and South Fork (two sites) of Beaver Creek and in lower Beaver Creek, but no bull trout/Dolly Varden were found. Upper Beaver and Lightening creeks have not been surveyed.

The Blue Buck Creek population, probably the last remaining bull trout/Dolly Varden population in this basin, was discovered in the early 1990s with electrofishing gear. Low abundance and limited distribution prompted discontinuation of the use of this potentially lethal gear. Test fishing with hook/line verified bull trout/Dolly Varden presence, that their numbers and range are very limited, and that introgression with brook trout is occurring. Data quality in Blue Buck Creek is fair; only presence/absence data are available.

An interview with a local angler whose familiarity with the fishes of the South Fork of Beaver Creek dates back to the 1940s revealed that bull trout/Dolly Varden were common to upper reaches of this stream. Only brook trout are present today.

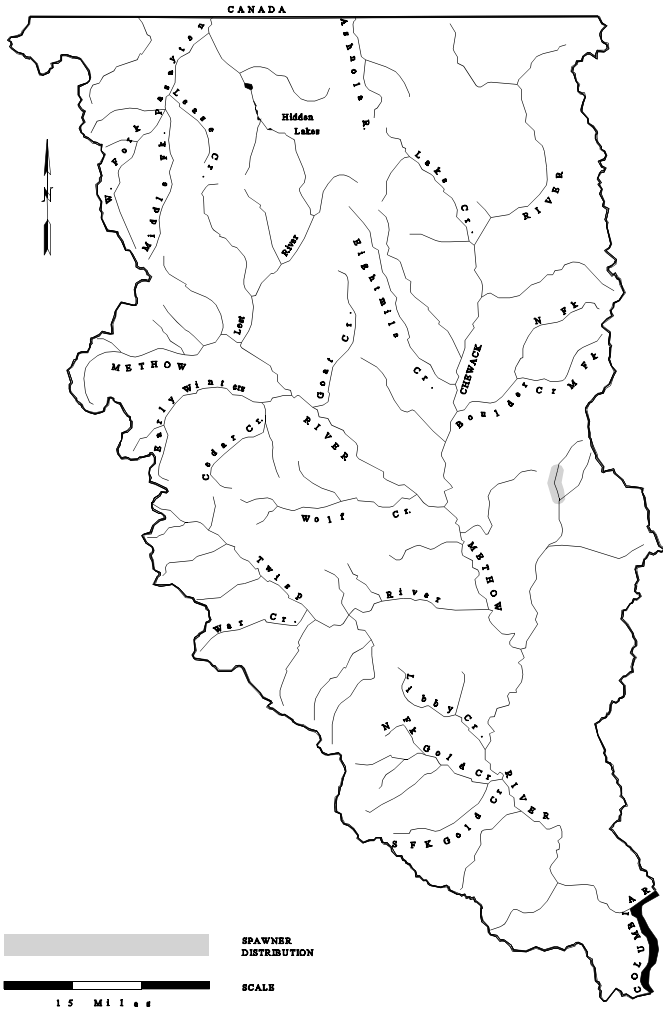
FACTORS AFFECTING PRODUCTION

Habitat--Blue Buck Creek is located on the eastern flank of the Methow basin and is exposed from the south and west. Suitably cold water in south/west-facing streams is found at much higher elevations and gradients and lower stream order than in north/east-facing streams.

STOCK DEFINITION PROFILE for Beaver Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Beaver Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Accordingly, in Blue Buck Creek bull trout/Dolly Varden are distributed at 4,600 to 4,800 feet elevation in a very small second-order stream where the gradient is 7.8%. The upper half of the Beaver Creek basin is on U.S. Forest Service land; the lower half is on private farm land.

Timber harvesting and road building have severely sedimented and deforested the Blue Buck Creek basin. During late summer the entire flow in lower Beaver Creek is used for irrigation, but migratory bull trout/Dolly Varden still may have access to headwater reaches during spring runoff if they can pass numerous beaver dams.

Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of fluvial fish.

Harvest Management--Roads associated with timber harvesting have made Blue Buck Creek highly accessible to anglers during the summer, but there appears to be little fishing interest. Poaching is minimized by road closure (locked-gate) at the peak of spawning. Bull trout/Dolly Varden harvesting is prohibited. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Brook trout were stocked in Beaver Lake (source of the South Fork Beaver Creek) in 1933. Brook trout were released directly into Beaver Creek in 1948, 1955, and 1958, though the precise location of the releases is unknown. The early extirpation of South Fork bull trout/Dolly Varden was due to directed releases of brook trout into that stream. The late invasion of Blue Buck Creek is a function of distance from spreading brook trout released in other parts of the basin, movement through the rainbow trout zone at lower elevation, and movement upstream through a high-gradient gorge.

Catchable-size rainbow trout from Winthrop National Fish Hatchery were released into Beaver Creek in the 1950s and 1960s. Though new fisheries harvested some parr and adult bull trout/Dolly Varden, the net effect was benign because stockings and fisheries were far below the breeding and initial rearing habitat of bull trout/Dolly Varden.

A single stocking of cutthroat trout was made from horseback in upper Beaver Creek (above Blue Buck Creek) and in Blue Buck Creek in 1963, but it is unclear whether self-sustaining populations were established. The point is academic, since cutthroat and bull trout/Dolly Varden are ecologically compatible.

Species Interactions--Introduced brook trout are widespread in the Beaver Creek basin. They have replaced bull trout/Dolly Varden in the South Fork and they are now in the process of extirpating them in Blue Buck Creek.

METHOW -- TWISP BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Twisp River bull trout/Dolly Varden are native and distinct from other stocks due to their geographic distribution. The size of spawners noted during redd counting indicates that the fluvial life history form is present in the Twisp River, and the resident form is present in lower North Creek. Spawning occurs in the mainstem between North Creek (a few resident fish spawn in lower North Creek) to the falls from early September through mid-October.

STOCK STATUS

Stock status is Unknown. A standing crop estimate made at RM 27.1 in 1987 showed good numbers of juvenile bull trout/Dolly Varden. Redd counts prior to 1995 were conducted too early in the year and were confined to the upper breeding zone. The redd count in 1995 was the third largest for Methow basin streams. More escapement data are needed to more accurately assess status, but the only unnatural limiting factor seems to be fishing mortality. Data quality is excellent (standing crop estimate and 1995 redd count) but poor for redd count data prior to 1995, when counts were incomplete.

FACTORS AFFECTING PRODUCTION

Habitat--This fourth-order river is 28.2 miles long and drains a basin of 247 square miles. The spawning area is from RM 26.1 to RM 28.0, has a gradient of 5.7%, and elevation ranges from 3,450 to 4,020 feet. Minimum flow is 66 cfs above RM 4.0, where 62 cfs are withdrawn for irrigation. All but the lower 13 miles of river are within the Okanogan National Forest.

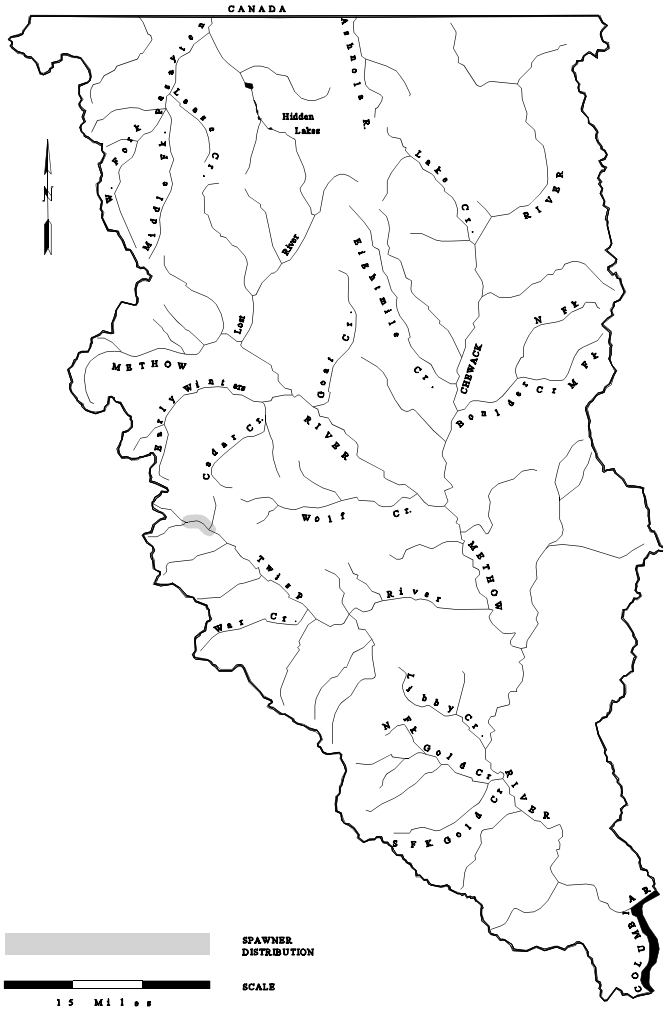
The habitat is pristine. Summer flow is sustained by glaciers, and water temperatures may actually decline during drought, since the percentage of glacier meltwater increases then. The glaciers are key in maintaining cold water in the event of increasing air temperatures. The gradient is high, and riffles outnumber pools. Boulders and turbulence are the predominant cover type. Gravel and large woody debris are naturally limiting.

Columbia River productivity has declined from the impoundment of a free-flowing river, and the dams kill and obstruct some migrants.

STOCK DEFINITION PROFILE for Twisp Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

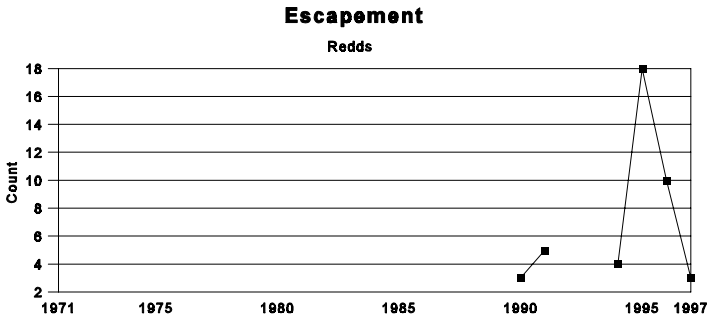
DISTINCT? - Unknown

STOCK STATUS PROFILE for Twisp Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	ESCAPE Redds	ESCAPE Redds	FW PROD No./100m^2	
73				
74				
75				
76				
77				
78				
79				
80				
81				
82			5.9	
83				
84				
85				
86				
87			5.9	
88				
89				
90	3			
91	5			
92				
93				
94	4			
95	18	3		
96	10			
97	3			



The 1990, 1991, 1994 and 1996 redd surveys were incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Harvest Management--Bull trout/Dolly Varden are protected from harvest, but bait fishing remains legal, and some hooking mortality and illegal harvest of bull trout/Dolly Varden occur. Hooking mortality and illegal harvest of bull trout/Dolly Varden downriver in the Methow and Columbia rivers are expected to decline as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Brook trout were stocked in the 1950s in beaver ponds and sloughs adjacent to the Twisp River, but none are seen today.

Rainbow trout fry and catchable-size fish have a long history of releases dating back to the 1930s, yet the effect on bull trout/Dolly Varden has not been significant because the releases have not expanded the distribution of hatchery-origin fish over native fish and the releases, and fisheries, occur well below bull trout/Dolly Varden spawning and rearing areas.

The Twisp River road terminates in a campground near the center of the spawning area. During the 1970s and 1980s catchable-size residual steelhead from Wells Hatchery were stocked each summer drawing a fair number of bait anglers. Bull trout/Dolly Varden harvest, however, was minimized due to the torrential, brushy character of the river. Fishing pressure and harvest rates declined upon termination of hatchery catchable releases in the 1990s.

A few cutthroat trout are found below the falls in the bull trout/Dolly Varden zone. Above the falls they are extremely abundant and originated from alpine lake stocking. They are ecologically compatible with bull trout/Dolly Varden.

Species Interactions--Rainbow trout abut the bull trout/Dolly Varden population at North Creek, leaving about two miles of prime spawning and fry-rearing habitat, an intermediate amount relative to habitat available to other populations. The barrier falls prevent full distribution of bull trout/Dolly Varden into cold-water reaches which would provide the greatest protection from invasion by rainbow trout if climate warming should occur.

METHOW -- EAST FORK BUTTERMILK CREEK
BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This stock is native and distinct, separated geographically and thermally from other bull trout/Dolly Varden populations. The stock contains fluvial and resident life history forms. Spawning is limited to the area about 0.5 mile of the falls (RM 3.2) and occurs from early September to mid-October.

STOCK STATUS

Stock status is Unknown. Though abundance per unit area suggests a Healthy status, low total population size due to limited habitat may decrease fitness (due to possible reduced genetic variability), and a more conservative status may be appropriate.

Data are limited to a standing crop estimate at RM 2.7 and a redd survey in 1995. The redd survey was complete in terms of reach coverage, but only a single survey in early October was conducted. Data quality is excellent.

FACTORS AFFECTING PRODUCTION

Habitat--The East Fork is a third-order stream that is 9.2 miles long. Basin area is 17 square miles. The gradient is 10%, minimum flow is 6.7 cfs, and elevation ranges from 3,600 to 4,000 feet. The East Fork is a torrential stream with large, clean boulders and limited gravel and large woody debris. The entire basin is on U.S. Forest Service land, and the headwaters are in the Sawtooth Wilderness.

Habitat in bull trout/Dolly Varden spawning and initial rearing areas remains in pristine condition, despite recent timber harvesting on the east flank of the basin. Two road crossings occur, one above and below the bull trout/Dolly Varden zone.

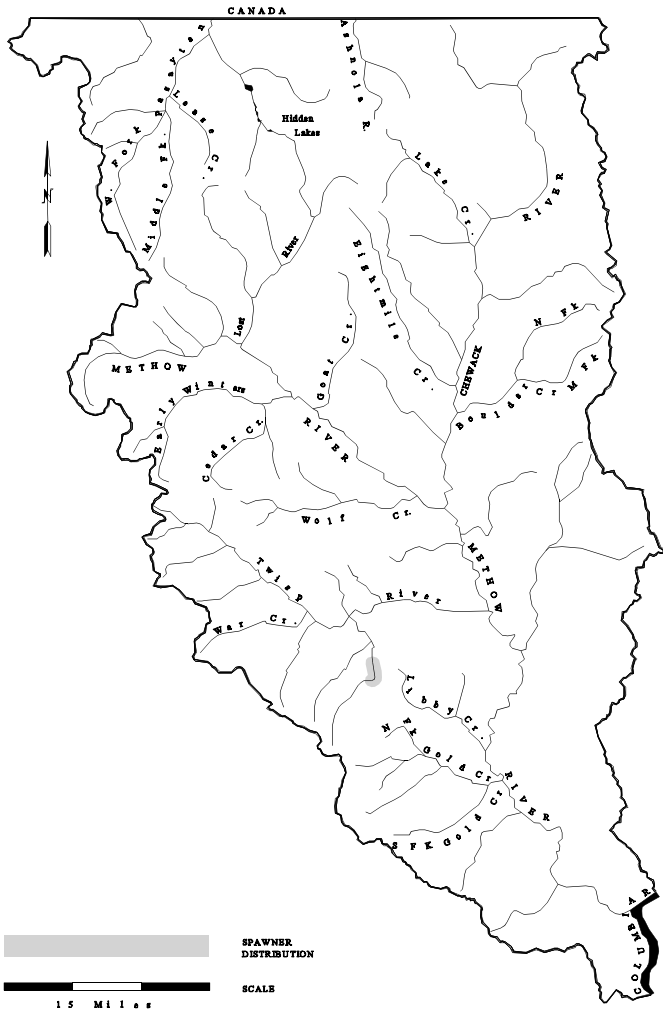
Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing of fluvial fish.

Harvest Management--Bull trout/Dolly Varden in the East Fork are moderately accessible in terms of road distance, but the steep, rugged topography is a deterrent to anglers. Poaching of fluvial spawners probably is low because anglers do not seem to be aware of bull trout/Dolly Varden here. Hooking mortality and illegal harvest of bull trout/Dolly Varden downriver in the Methow and Columbia rivers are expected to decline as a result of the closure of the recreational steelhead fishery. The closure is

STOCK DEFINITION PROFILE for EF Buttermilk Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for EF Buttermilk Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD No./100m^2	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89	13.1			
90				
91				
92				
93				
94				
95		4		
96		0		
97		0		

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

associated with the listing of steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Rainbow trout releases in 1948 (fry) and 1962 (catchable-size) are the only recorded plants in the East Fork, but cutthroat trout were undoubtedly were stocked above the falls. Interactions between hatchery-origin salmonids and bull trout/Dolly Varden in East Fork Buttermilk Creek are insignificant.

Species Interactions--Cutthroat trout and bull trout/Dolly Varden co-exist about 0.5 mile below the falls before rainbow trout appear. Slight warming would give rainbow trout a thermal advantage, and they could replace cutthroat and bull trout/Dolly Varden.

METHOW -- WEST FORK BUTTERMILK CREEK
BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This stock is native and distinct, separated geographically and thermally from other bull trout/Dolly Varden/Dolly Varden stocks. The stock is composed of fluvial and resident life history forms. Fluvial fish are separated from resident fish by a logjam impasse at RM 1.8. Spawning by resident fish ranges upstream to RM 3.8. The time of spawning is unknown.

STOCK STATUS

Stock status is Unknown but may be Depressed.

A standing crop estimate was made at RM 0.0 in 1988. Three hook and line surveys were conducted in 1983 and 1990. Data quality is fair. The results indicated that fish density was lower than would be expected based on available habitat.

FACTORS AFFECTING PRODUCTION

Habitat--This third-order stream is 9.6 miles long and drains an area of 17 square miles. The gradient is 5.0%, and elevation ranges from 3,600 to 4,100 feet. Minimum flow is 4 to 10 cfs. Habitat is pristine. Recent timber harvesting high above the west bank has caused no problems. The West Fork is a torrential stream with large, clean boulders and limited gravel and large woody debris. The entire basin is on U.S. Forest Service land, and the headwaters are in the Sawtooth Wilderness.

Because fluvial spawners cannot migrate above the logjam, upstream habitat may be underseeded above the falls.

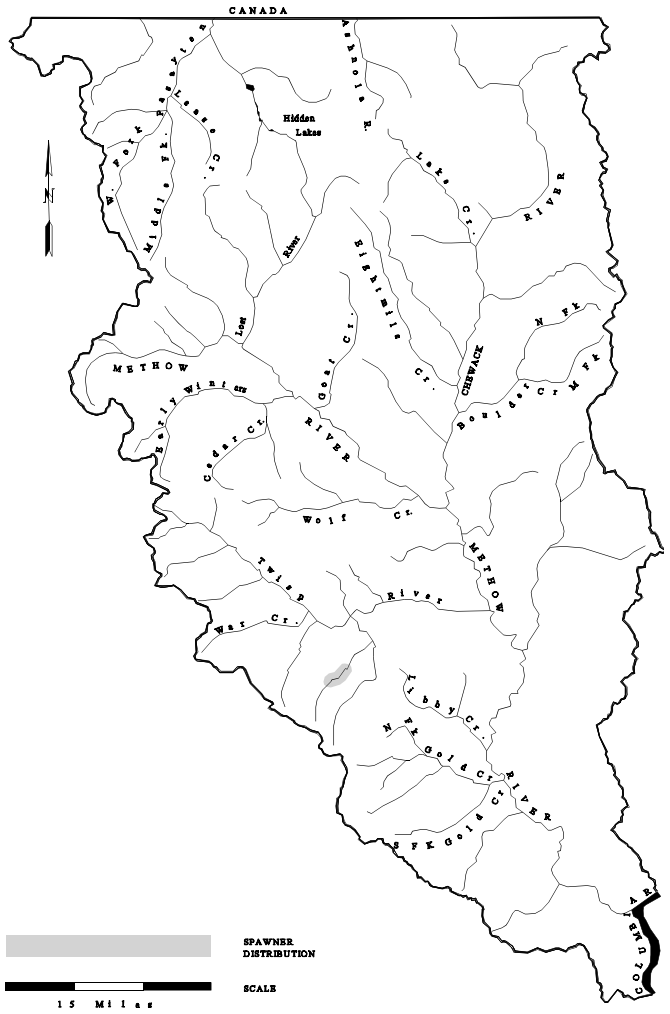
Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of fluvial fish.

Harvest Management--A well-used trail commences in the bull trout/Dolly Varden zone and follows the creek upstream. Downstream, easy access results from a road crossing. There is evidence of fishing in the West Fork and, though harvesting bull trout/Dolly Varden is prohibited, hooking mortality by anglers fishing with bait for cutthroat or rainbow trout could be significant. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is

STOCK DEFINITION PROFILE for WF Buttermilk Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for WF Buttermilk Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83	1.5			
84				
85				
86				
87				
88				
89	3.7			
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

associated with the listing of the upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--The only recorded releases of hatchery-origin fish in Buttermilk Creek occurred with the release of rainbow trout fry in 1948 (fry) and catchable-size rainbows in 1962. The effect of these releases on bull trout/Dolly Varden is unknown.

Species Interactions--The interface between bull trout/Dolly Varden and rainbow trout occurs at the falls, which suggests that the falls is a barrier to fish. As long as the falls (formed by a logjam) holds, rainbow trout will not be able to invade upstream bull trout/Dolly Varden populations. This probably explains why the bull trout/Dolly Varden are more widely distributed in the West Fork then in the East Fork. Elevations and temperature are similar in the two streams, and if the logjam should disappear, rainbow trout are sure to invade upstream, forcing bull trout/Dolly Varden into higher elevation, colder areas.

METHOW -- REYNOLDS CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This bull trout/Dolly Varden stock is both native and distinct, owing to geographic isolation of spawning grounds. Spawning is confined to the area between the falls (RM 0.7) and Forest Service Road 4430 (RM 0.2). Spawning occurs from mid-September through mid-October. The size of spawners noted during redd counting surveys confirms that the stock is fluvial. A barrier falls excludes the population from the coldest water, where the resident life history would otherwise be found.

STOCK STATUS

Stock status is Unknown but may be Critical. Trend data are based on single redd counts made in 1990 and 1995. The 1990 count was conducted too early, whereas the 1995 count was made at the proper time. The presence of bull trout/Dolly Varden is well established from sampling by electrofishing (two surveys) and hook and line (three surveys). Only one redd has been seen in two years of surveys. Data quality is fair.

FACTORS AFFECTING PRODUCTION

Habitat--This second-order stream is 6.0 miles long and drains an area of 8.3 square miles. The spawning area lies between RM 0.2 and RM 0.7 (the falls), has a gradient of 12.0%, and elevation ranges from 2,860 to 3,240 feet. Minimum flow is 1.5 cfs. The entire basin is on U.S. Forest Service land, and the headwaters are within the Sawtooth Wilderness.

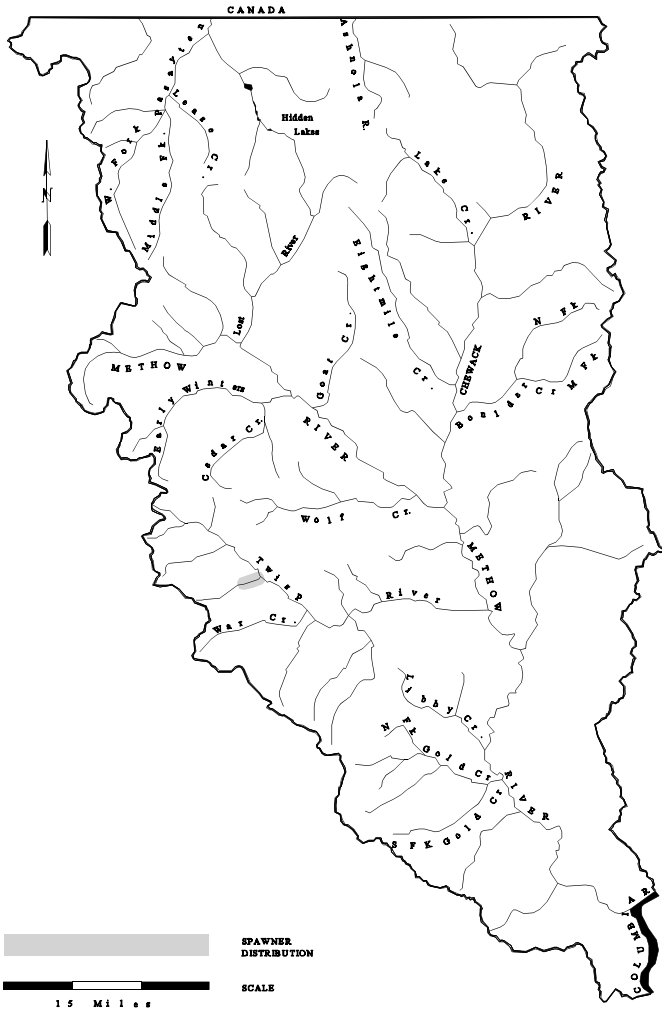
The habitat is essentially pristine except for Forest Service Road 4430 which crosses the creek. The road culvert is passable because fluvial bull have been seen above it along with marked steelhead smolts released below it. A tremendous falls at RM 0.7 confines bull trout/Dolly Varden to the short reach below. This stream is a torrential-boulder stream with limited gravel, little large woody debris, mostly riffles and few pools. Ordinarily, bull trout/Dolly Varden would not be found at this low elevation (3,000 ft.) because the water would be too warm. The water is inordinately cold for this elevation from short-run glacial snowmelt off Reynolds Peak. Water temperatures may actually decline during the hottest, driest summers, since the percentage of glacier meltwater increases at that time.

Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstruction migration of fluvial fish.

STOCK DEFINITION PROFILE for Reynolds Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Reynolds Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	1			
91				
92				
93				
94				
95	0			
96				
97				

The 1990 and 1995 redd surveys were incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Harvest Management--Bull trout/Dolly Varden are protected form harvest in Reynolds Creek. Rainbow trout are open to harvest, and bait is allowed. Some incidental hooking mortality occurs with bait-caught bull trout/Dolly Varden, but fishing effort is so low that this is probably insignificant. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Steelhead residual smolts were released into Reynolds Creek below the road once in the mid-1980s, but only a few moved upstream through the culvert to bull trout/Dolly Varden habitat, and no adverse interactions were observed. There is no record of fish releases above the falls.

Species Interactions--A few rainbow trout are found with bull trout/Dolly Varden up to the barrier falls. This suggests that the tenuous balance between the two species is at the threshold of a rainbow trout takeover if the water warms only slightly over the long-term.

METHOW -- LAKE CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This adfluvial stock of native bull trout/Dolly Varden spawns in isolation in Lake Creek from Black Lake to Three Prong Creek. Spawning occurs later than with other stocks, from late September to late October. A few fluvial fish have been found below Black Lake in Lake Creek and the Chewuch River, and since Lake Creek supports the only known bull trout/Dolly Varden population in the Chewuch basin, these fish probably are of Lake Creek origin.

STOCK STATUS

Stock status is Unknown but may be Healthy. Black Lake was sampled by gill net in 1972. The initial redd count was made in 1995. The 22-redd total was second highest for Methow basin populations. Data are limited, but data quality is excellent.

FACTORS AFFECTING PRODUCTION

Habitat--Lake Creek is a third-order stream that drains a basin of 54 square miles. Minimum flow is 11 to 17 cfs. The spawning habitat lies between RM 8.1 and RM 9.7 at elevations ranging from 3,982 feet to 4,250 feet and a gradient of 3.2%.

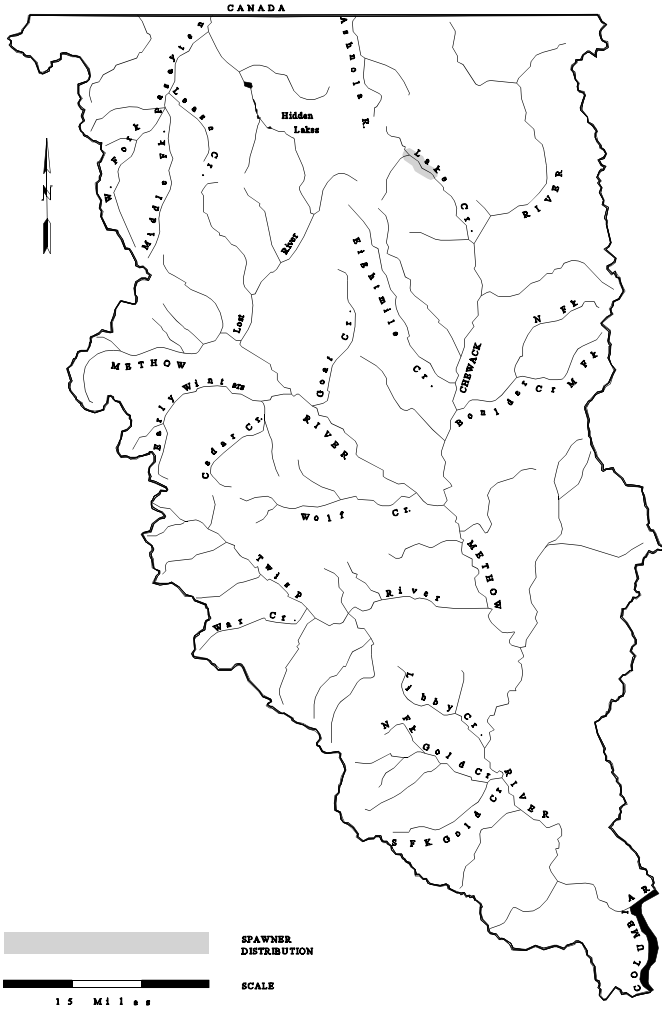
The habitat is uninfluenced by human activity, and its location in the U.S. Forest Service Pasayten Wilderness should minimize perturbations by humans. Aspect is southern, so water temperature is relatively warm. Yet at elevations exceeding 4,000 feet, the water is sufficiently cold to support bull trout/Dolly Varden. Spawning gravel is reasonably abundant. A combination of large woody debris and boulders provides excellent cover for rearing juveniles.

Harvest Management--Though reaching Black Lake requires a five-mile hike, the trail is not difficult and conveys heavy traffic to many other destinations in the Pasayten Wilderness. The result is that fishing intensity in Black Lake is moderate. This is mitigated somewhat by the lake's size and depth. Bait-based hooking mortality and illegal harvest may be significant even though harvesting bull trout/Dolly Varden is not permitted. Bait is prohibited in Lake Creek above the wilderness boundary, about 1.5 miles below Black Lake. Poaching of spawners is limited because spawning is late, spread out across the spawning area, of short duration, and occurs in brushy reaches not easily reached by anglers. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated

STOCK DEFINITION PROFILE for Lake Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning										■			Yes

BIOLOGICAL CHARACTERISTICS

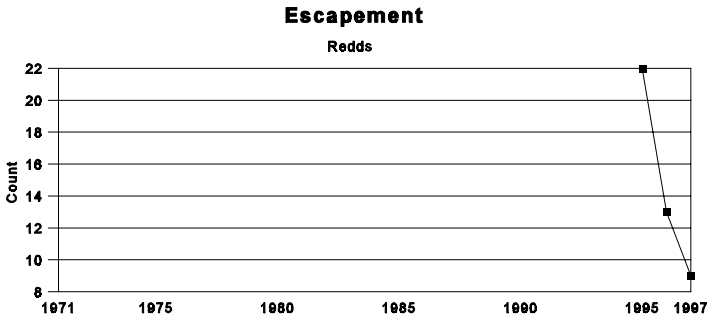
DISTINCT? - Unknown

STOCK STATUS PROFILE for Lake Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds	FW PROD Fish/Hr		
72		1.5		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95	22			
96	13			
97	9			



The 1996 redd survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Rainbow trout releases in Black Lake ceased many years ago, and effects are considered insignificant because rainbow trout are indigenous, themselves affecting bull trout/Dolly Varden as much or more than their hatchery-origin counterparts. The cutthroat trout in upper Lake Creek are recruits from naturalized populations in alpine lakes that were originally stocked with cutthroat trout. Cutthroat trout and bull trout/Dolly Varden are ecologically compatible.

Species Interactions--Rainbow trout dominate the biomass of salmonids in Lake Creek below Black Lake and share Black Lake with bull trout/Dolly Varden. But from Black Lake to Three Prong Creek bull trout/Dolly Varden dominate because cold water favors them. Above Three Prong Creek only cutthroat trout are found, due to a barrier falls that marks the upstream limit of bull trout/Dolly Varden distribution.

METHOW -- WOLF CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This stock is native and distinct owing to reproductive isolation from other bull trout/Dolly Varden stocks. The stock is thought to have resident and fluvial components. Resident bull trout/Dolly Varden have been confirmed from female size-at-maturity data. Fluvial fish have not been observed because redd surveys have not been conducted yet, but they surely exist. Spawning occurs from the North Fork of Wolf Creek to a point unknown below the South Fork of Wolf Creek. Spawn timing is early September through mid-October.

STOCK STATUS

Stock status is Unknown. No unnatural limiting factors affect this stock; so its status may be Healthy.

Four standing-crop surveys have been made, but only the one at RM 7.2 in 1990 was conducted fully in the bull trout/Dolly Varden zone. Redd counts are available. Data quality is excellent for presence/absence data but poor for trend data.

FACTORS AFFECTING PRODUCTION

Habitat--This third-order stream is 14.0 miles long and drains a basin of 38 square miles. Minimum flow at RM 4.2 is 8.0 cfs. Spawning starts at RM 7.2, but it stops at some unknown point below the East Fork falls at RM 10.3. The gradient from RM 5.9 to RM 8.0 is 5.1%, and elevation ranges from a low of 3,060 to 3,620 feet, though the elevation of the upper distribution is unknown.

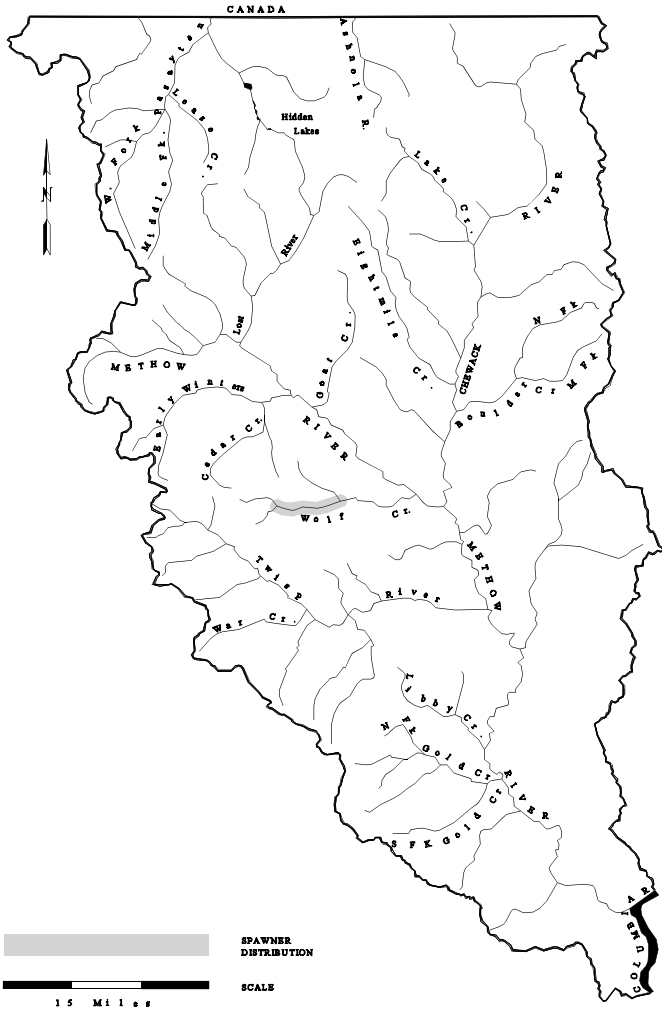
In the bull trout/Dolly Varden zone habitat remains unaltered. In the rainbow trout zone at RM 4.2 a sizeable volume of flow is diverted into Patterson Lake, and some fluvial parr migrants are lost. Some smaller diversions downstream combine with a permeable delta to dry the stream channel by late summer, though it is possible that the stream might dry up naturally. This has little bearing on migration, since bull trout/Dolly Varden enter and leave before and after the dry period.

Most spawning gravel is deposited in the lower 0.5 mile of the bull trout/Dolly Varden zone from torrential flow upstream. Cover consists mainly of boulders, turbulence, and overhanging riparian vegetation. Large woody debris is limited because spring flooding tends to remove it. Riffles outnumber pools in this torrential stream.

STOCK DEFINITION PROFILE for Wolf Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Wolf Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Poor

Return Years	FW PROD No./100m^2	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	7.7			
91				
92				
93				
94				
95				
96		7		
97		3		

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

A major fire burned much of the headwater of Wolf Creek in the mid-1980s, but there have been no discernable effects as determined by the 1990 surveys, which revealed large standing crops of salmonids and a clean substrate.

The capacity of the Columbia River for rearing fluvial bull trout/Dolly Varden has been diminished by hydroelectric development, and dams kill and obstruct some migrants.

Harvest Management--Wolf Creek is closed to the taking of bull trout/Dolly Varden. It is too isolated to receive significant angling effort and to suffer significant angling-related mortality (hooking mortality, illegal harvest, or poaching spawners). Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Cutthroat trout were established above the falls from four horseback releases in the early 1960s. Bull trout/Dolly Varden were probably unaffected because of the ecological compatibility of the two species. Hatchery-origin rainbow trout fry were introduced several times from 1939 to 1953 into lower Wolf Creek well below the bull trout/Dolly Varden zone into an existing native rainbow trout stock. Effects were likely insignificant because the rainbow trout distribution did not increase, and releases occurred far below the bull trout/Dolly Varden zone.

Species Interactions--The rainbow/bull trout/Dolly Varden interface occurs at North Fork Wolf Creek at RM 5.9. Bull trout/Dolly Varden are present at RM 7.2 but not at the falls at the South Fork Wolf Creek (RM 10.3). The precise upstream limit of distribution is unknown, but the amount of suitable habitat is at least average. Invasion by rainbow trout is unlikely because the water draining into Wolf Creek from northslope tributaries is cold.

METHOW -- GOAT CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This native stock is considered distinct based on its thermal and geographical isolation from other bull trout/Dolly Varden stocks. The stock has resident and fluvial life history components. Spawning occurs from early September through mid-October from about RM 9.0 to RM 10.8.

Resident fish are verified through size-at-maturity of females. Fluvial fish are assumed present because there is no natural barrier to isolate this population. A fish that was too large to be a resident fish was observed just below a culvert at RM 6.8 (a possible barrier) in 1995.

STOCK STATUS

Stock status is Unknown but may be Depressed.

Electrofishing, chemical sampling, and test fishing with hook/line have all shown the presence of bull trout/Dolly Varden, but only test fishing from RM 10.0 to RM 11.5 in 1990 was conducted fully in the bull trout/Dolly Varden zone. Redd counting began in 1995. Data quality is fair for presence/absence data and excellent but limited for redd counts.

Counts indicate that abundance is lower than expected based on available habitat.

FACTORS AFFECTING PRODUCTION

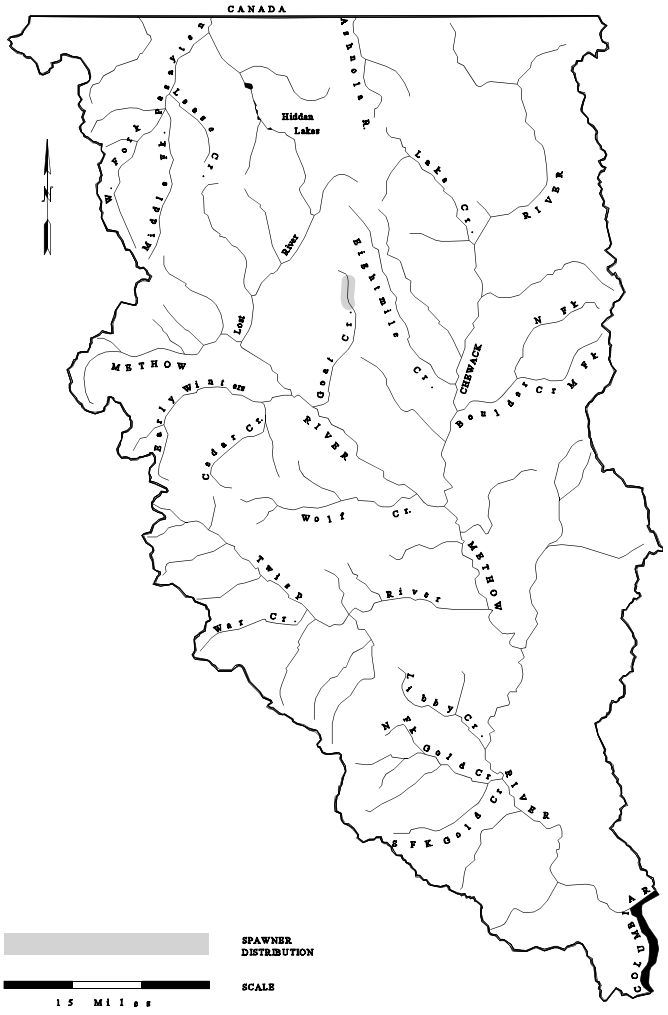
Habitat--This third-order stream is 12.5 miles long and drains an area of 36 square miles. Minimum flow is 3 to 5 cfs. The gradient is 6.7%. Elevation ranges from 4,680 to 5,320 feet. Exposure is south and west, which means that water cold enough for bull trout/Dolly Varden is not encountered until the elevation is high. The upper end of their distribution is so high in elevation that the stream becomes a second-order stream too small for bull trout/Dolly Varden. Except where Goat Creek enters private holdings on the Methow Valley floor, the stream is in the Okanogan National Forest.

Cattle grazing in the valley increases sedimentation. Timber harvesting has reduced riparian shading in upper Goat Creek. There is a good mix of pools and riffles and boulders, gravel, and large woody debris. The culvert at RM 6.8 may obstruct fluvial fish from reaching spawning habitat.

STOCK DEFINITION PROFILE for Goat Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Goat Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD Fish/Hr	ESCAPE Index Total	ESCAPE Redds	
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90	1.5			
91				
92				
93				
94				
95		0	0	
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

For fluvial fish the productivity of the Columbia River has probably been reduced from its alteration from a free-flowing river to a reservoir, and dams kill some migrants and obstruct migration of others.

Harvest Management--Regulations forbid the taking of bull trout/Dolly Varden, but cutthroat and rainbow trout attract anglers, resulting in hooking mortality (bait is allowed) and illegal harvest. The bull trout/Dolly Varden zone is not accessible by established trail, though a low-use road terminates within 0.5 mile of the creek. Judging by streamside evidence, angling pressure is low. Fluvial fish are vulnerable to fishing in the pool below the culvert if it blocks or delays fish passage. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Westslope cutthroat are the only salmonid released into upper Goat Creek, and resulting interactions with bull trout/Dolly Varden are not considered negative.

Species Interactions--Bull trout/Dolly Varden and cutthroat co-exist above RM 9.0. Below this point rainbow trout predominate and can replace bull trout/Dolly Varden if the climate warms moderately.

METHOW -- EARLY WINTERS CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The Early Winters Creek stock of native bull trout/Dolly Varden is distinct based on its geographic and thermal isolation from other stocks. Resident bull trout/Dolly Varden occupy the creek above Early Winters Creek Falls at RM 7.9. The presence of fluvial fish is based on anecdotal information. Fluvial fish, which may be resident emigrants, are found below the falls. Resident fish in Early Winters Creek spawn from RM 7.9 to RM 14.5. The fluvial component of the stock spawns from the falls to about one mile downstream. Spawn timing is from early September to mid-October.

STOCK STATUS

Stock status is Unknown, although the status of the resident form may be Healthy. Standing crop estimates are available at three sites on Early Winters Creek. Data quality is excellent for presence/absence data, but trend data (redd counts) are not available. Resident bull trout/Dolly Varden are widely distributed and abundant. Determining status of fluvial bull trout/Dolly Varden is confounded by recruitment of resident bull trout/Dolly Varden below the falls. Therefore we do not know if the juvenile bull trout/Dolly Varden surveyed at RM 5.0 (see Stock Status Profile) are the progeny of resident or fluvial spawners.

FACTORS AFFECTING PRODUCTION

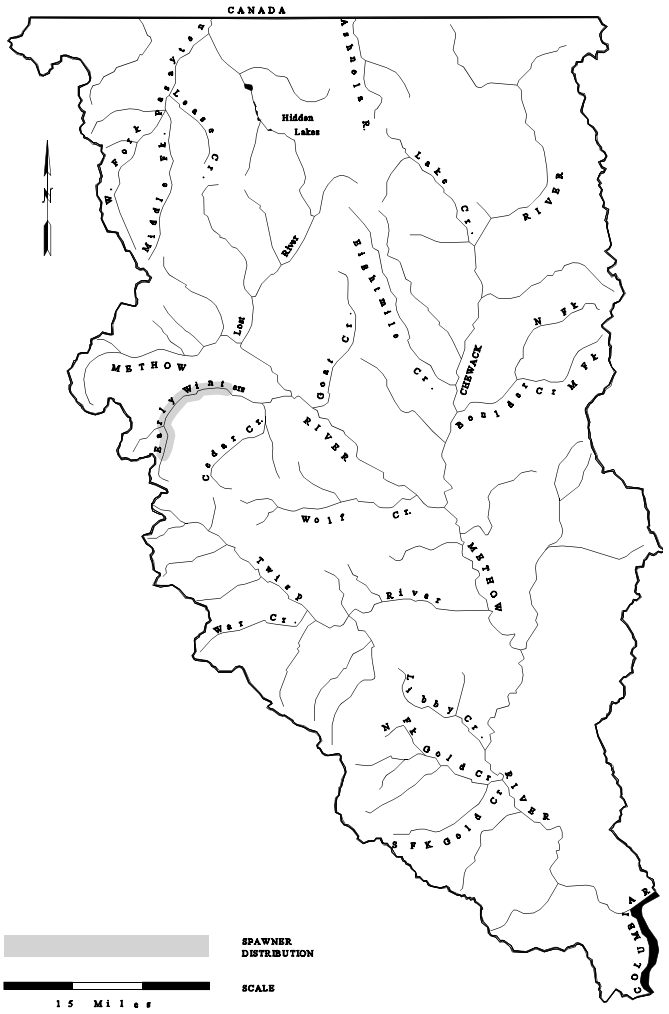
Habitat--This fourth-order stream is 15.7 miles long and drains an area of 79 square miles. The basin contains seven glaciers and four lakes. Minimum low flow in the summer is 24 cfs (below the irrigation diversion of 23 cfs) versus 29 cfs low flow in the winter. The gradient and elevation in the resident life history form zone are 4.1% and 3,380 to 4,800 feet versus 3.5% and 3,195 to 3,380 feet in the fluvial life history zone. This a very cold stream. As much as 44% of the flow in a hot, dry summer may be glacier melt.

The habitat is both pristine and abundant above the falls. The fluvial form reach is thermally limited. Except for Highway 20, which follows the creek from mouth to headwater, the watershed has been altered little, especially in the bull trout/Dolly Varden zones. There is good a mix between pools and riffles, and gravel is plentiful. The substrate is diverse, with large boulders the predominate cover in torrential zones and large woody debris in low-gradient reaches.

STOCK DEFINITION PROFILE for Early Winters Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Early Winters Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD No./100m^2	FW PROD No./100m^2	FW PROD No./100m^2	ESCAPE Redds
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86	1.5			
87				
88				
89		6.1	6.9	
90				
91				
92				
93				
94				
95				
96				9
97				0

Column 1: Sampled at RM 5.0.
Column 2: Sampled at RM 8.8.
Column 3: Sampled at RM 12.3; 1996 and 1997 redd surveys incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of fluvial fish.

Harvest Management--Though thousands of people traveling Highway 20 pass within yards of this stream annually, imposing talus slopes and dense riparian vegetation discourage fishing in the upper Early Winters Creek (above the falls) except at Lone Fir Campground. Judging from well-worn trails, more angling intensity is directed at the stream immediately below the falls because of easy access and the concentration of large fish. The stream is closed to the taking of bull trout/Dolly Varden, but some hooking mortality occurs when bait is used. Also, the incidence of illegal harvest though misidentification of bull trout/Dolly Varden is likely higher here because spontaneous use from visual stimulation while traveling the highway increases the number of casual, uninformed anglers. The importance of harvest on fluvial fish is dependent on their origin, that is, if they were spawned below the falls and are not emigrant resident fish from above the falls. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--Rainbow trout fry were released frequently into native rainbow populations below the falls starting in the 1930s. Starting in 1952 and continuing for about twenty years, catchable-size rainbow trout from Winthrop National Fish Hatchery were released each summer to provide stream fishing in the upper Methow Valley. Releases were made below the bull trout/Dolly Varden zones and caused no additional interaction problems beyond those with native rainbow trout. The resulting fishery harvested some passing migratory bull trout/Dolly Varden, but the effect was probably low, because the fishery was localized and fluvial fish passed through the area during high flows when angling pressure was low and ineffective.

Above the falls, cutthroat trout were stocked in Cutthroat Lake, but details are undocumented. This self-sustaining population then expanded downstream into Early Winters Creek via Cutthroat Creek, where bull trout/Dolly Varden predation limits their abundance. Cutthroat trout have not adversely affected bull trout/Dolly Varden.

Species Interactions--The resident form is protected from downstream invaders by the falls and is the most secure population in the Methow basin. The fluvial form has limited cold water to shield it from rainbow trout invaders and is highly vulnerable to slight climatic warming. A few rainbow trout already have reached the falls on Early Winter Creek and threaten fluvial fish if those fish, indeed, originate below the falls and not above it.

METHOW -- CEDAR CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The Cedar Creek stock of native, fluvial bull trout/Dolly Varden is distinct based on its geographic and thermal isolation from other species. They spawn immediately below Cedar Creek Falls (RM 2.4) to about 0.5 miles downstream. Spawn time is unknown.

STOCK STATUS

Stock status is Unknown. One standing crop estimate in bull trout/Dolly Varden habitat is available. The quality of the standing crop data is excellent but limited. The standing crop information verifies the presence of bull trout/Dolly Varden but is insufficient to determine status. Trend data (redd counts) are not available.

FACTORS AFFECTING PRODUCTION

Habitat--This third-order stream is 9.4 miles long, and drains a basin of 31 square miles. The gradient is 10.2%, and elevation ranges from 3,240 to 3,510 feet. Minimum flow is 14 cfs. All of the basin is on the Okanogan National Forest.

Cedar Creek is a high-gradient torrential stream with a substrate dominated by cobbles and boulders that is gravel- and large woody debris-limited. The channel stairsteps from one plunge pool to another. The low-elevation falls limits the amount of cold water habitat available to bull trout/Dolly Varden.

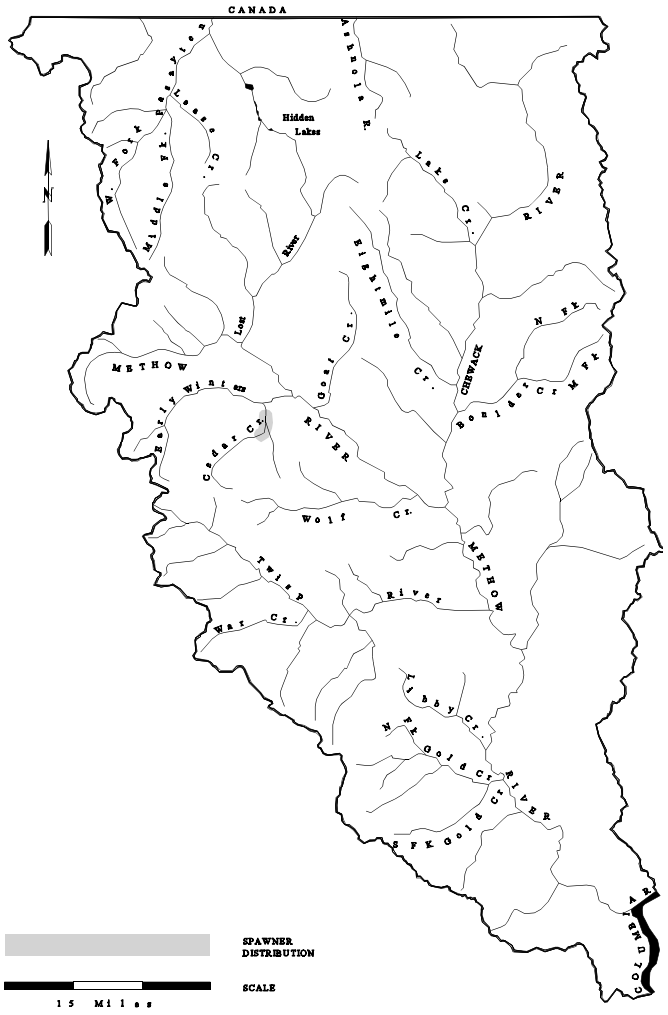
Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of fluvial fish.

Harvest Management--Thousands of people traveling the North Cascades Highway pass within a short distance of this stream annually. An old roadbed offers relatively easy access to lower Cedar Creek, and though the stream is closed to the taking of bull trout/Dolly Varden, fishing intensity is enough to cause significant losses to hooking mortality (bait is legal) and illegal harvest. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for Cedar Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Cedar Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD No./100m^2	ESCAPE Redds		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87	3.9			
88				
89				
90				
91				
92				
93				
94				
95				
96		2		
97				

The 1996 red survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Hatchery--Rainbow trout fry were released into wild populations of rainbow trout in 1939 and 1944 in lower Cedar Creek. Cutthroat trout were native below the falls and were stocked above the falls in the 1960s. Hatchery-origin fish have had no significant effect on bull trout/Dolly Varden in Cedar Creek.

Species Interactions--Cutthroat trout and bull trout/Dolly Varden co-inhabit Cedar Creek below the falls. Water cold enough to protect bull trout/Dolly Varden from invading rainbow trout is very limited because Cedar Creek Falls bar them from moving upstream to colder water. Accordingly, this stock is highly vulnerable to slight climatic warming that would swing thermal advantage to rainbow trout.

METHOW -- LOST RIVER BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This stock is native and distinct, owing to its geographic isolation, though some gene flow may occur with the adfluvial stock in Cougar Lake when Lost River resident fish enter Cougar Lake or Cougar Lake adfluvial fish move into the Lost River. Female size-at-maturity has shown Lost River stock to be composed of resident fish. Fluvial spawners are blocked by a barrier falls at RM 9.6. Lost River bull trout/Dolly Varden spawn from about a mile above Drake Creek to Cougar Lake. Spawn time is unknown.

STOCK STATUS

Stock status is Healthy. The healthy status is based on high abundance, i.e., 1,092 (210 fish per mile) catchable-size bull trout/Dolly Varden.

Data quality is excellent. A standing crop estimate of resident bull trout/Dolly Varden from Drake and Diamond creeks (RM 11.7 to RM 16.9) was made in 1993. Since then, the entire reach has been test-fished annually in the first week of September by hook and line. Redd counting for fluvial spawners from Eureka Creek to Monument Creek started in 1994 and continued in 1995.

FACTORS AFFECTING PRODUCTION

Habitat--This third-order river is 22.5 miles long and originates from Cougar Lake. The basin area is 146 square miles. Spawning occurs between RM 11.7 and RM 20.3, but population density is highest between RM 12.8 and RM 15.5, where the gradient is 2.0% and elevations range between 3,640 and 3,930 feet.

Minimum flow is 43 cfs just below Eureka Creek but is less above Drake Creek. Lost River was named for the fact that it is "lost" to the substrate at various points above Monument Creek.

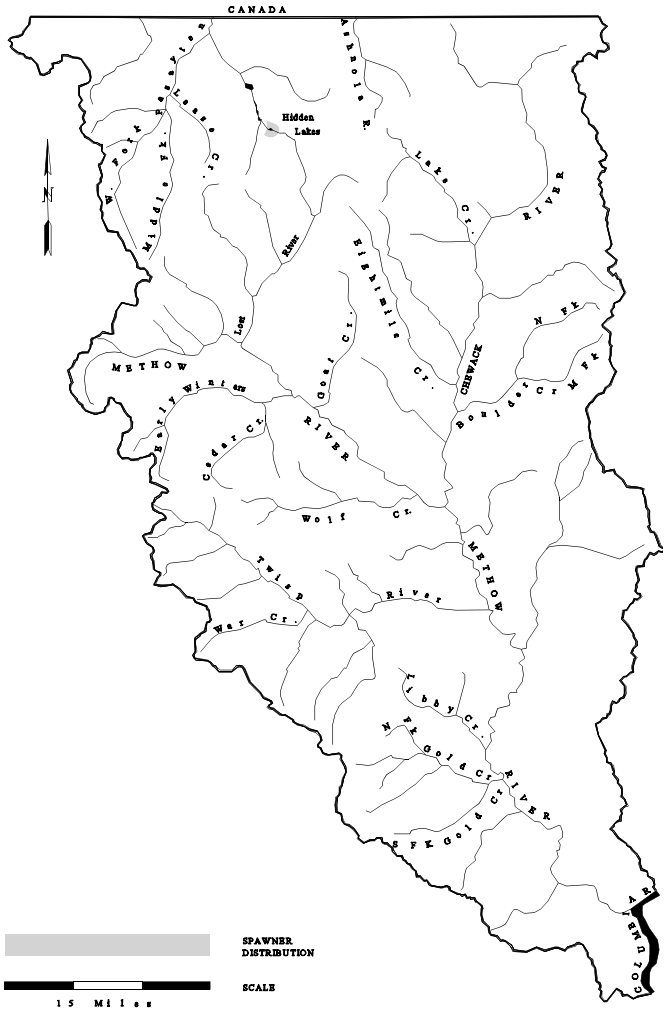
The extent and number of dry reaches depends on snowpack and summer precipitation. In 1994, an exceptionally dry year, four dry reaches totaling about 67% of the stream channel were observed in early September.

All bull trout/Dolly Varden populations in the Lost River are located within the Pasayten Wilderness, and their habitat has not been altered by human activities.

STOCK DEFINITION PROFILE for Lost River Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

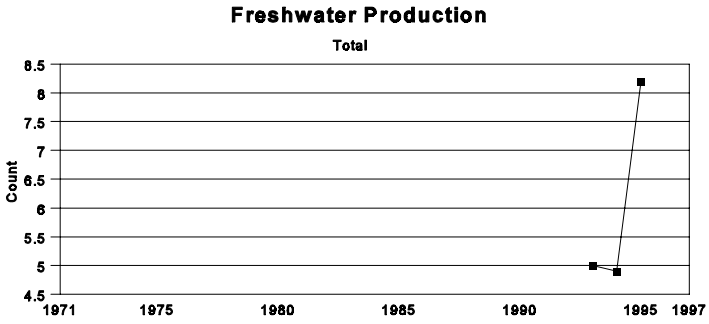
DISTINCT? - Unknown

STOCK STATUS PROFILE for Lost River Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	FW PROD Total	FW PROD Total	ESCAPE Redds	
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93	5.0	1,092		
94	4.9			
95	8.2			
96			5	
97			0	



The 1995 survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Healthy

Screening Criteria

The gradient from Cougar Lake to a point due east of Rampart Lake is low. Cover in this reach is large woody debris, which is scarce except for a few large logjams. Gravel is profuse. Below this reach almost to Drake Creek the river roars down a steep gorge. A few long pools and runs are present, but whitewater riffles are the rule. Boulders and turbulence provide cover; large woody debris is nearly absent. Fair amounts of gravel are widely scattered.

Harvest Management--Lost River above Drake Creek is open to bull trout/Dolly Varden harvest. Fishery rules include a bait prohibition and a 14-inch minimum size limit intended to permit most females to spawn at least once. Angling is minimized by the seven rugged, trailless miles required to reach the lower end of this reach. The canyon reach is accessible only in late summer when flow recedes enough for fording. Almost no fishing occurs in this reach. Some fishing occurs below Cougar Lake, in the vicinity of the horsecamp around Diamond Creek, and in the area just above the mouth of Drake Creek.

Hatchery--Rainbow trout were introduced into Cougar Lake in the 1930s. Rainbows are probably native to Cougar Lake and the Lost River above the falls. Their presence could be devastating to bull trout/Dolly Varden if the climate warms. At this time rainbow trout dominate bull trout/Dolly Varden in the warm outflow just below Cougar Lake whereas bull trout/Dolly Varden dominate downriver of Diamond Creek. Cutthroat trout are sparsely scattered throughout the Lost River above Drake Creek from naturalized plants made in Diamond Creek and Cougar Lake. Bull trout/Dolly Varden and cutthroat trout are ecologically compatible.

Species Interactions--Below the falls the Lost River is too warm for bull trout/Dolly Varden, and rainbow trout predominate. A few rainbows co-exist with bull trout/Dolly Varden between Drake and Diamond creeks, but they probably are downstream emigrants. Cougar Lake's warming effect tips the thermal advantage to rainbows, and they outnumber bull trout/Dolly Varden and cutthroats in the reach just below the lake. By late summer in all but the wettest years, this warm outflow disappears into the substrate above Diamond Creek. The cold water of Diamond Creek gives the advantage back to bull trout/Dolly Varden. The widespread presence of rainbow trout assures that they will prevail if warming favors them.

METHOW -- MONUMENT CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This native stock is distinct because it is isolated geographically from other stocks. Some fluvial fish are found in lower Monument Creek and may genetically link this stock with the Lost River stock if some of the fluvial fish are recruits from the Lost River stock (above the falls). The fluvial fish may also be recruits from the Monument Creek stock. Fluvial fish spawning is limited to the Monument Creek delta. Resident fish in Monument Creek spawn from the delta to some undetermined point at least 1.0 mile above the mouth. Spawn time is from early September through mid-October.

STOCK STATUS

Stock status is Unknown, although resident fish may be Healthy, and fluvial fish may be Depressed. Redd counting for fluvial spawners from Eureka Creek to Monument Creek started in 1994 and continued in 1995. Only one count was made each year because of the difficulty of making the count. Only seven fluvial fish redds have been counted in two years. Hook and line sampling in 1994 showed good abundance of resident bull trout/Dolly Varden. Data quality is fair.

The healthy status of resident fish is based on their abundance and the absence of unnatural limiting factors. Some hooking and illegal harvest of migratory bull trout/Dolly Varden occurs, and abundance is low, but their continued existence is assured by recruits from resident populations in Monument Creek and the Lost River above the falls.

FACTORS AFFECTING PRODUCTION

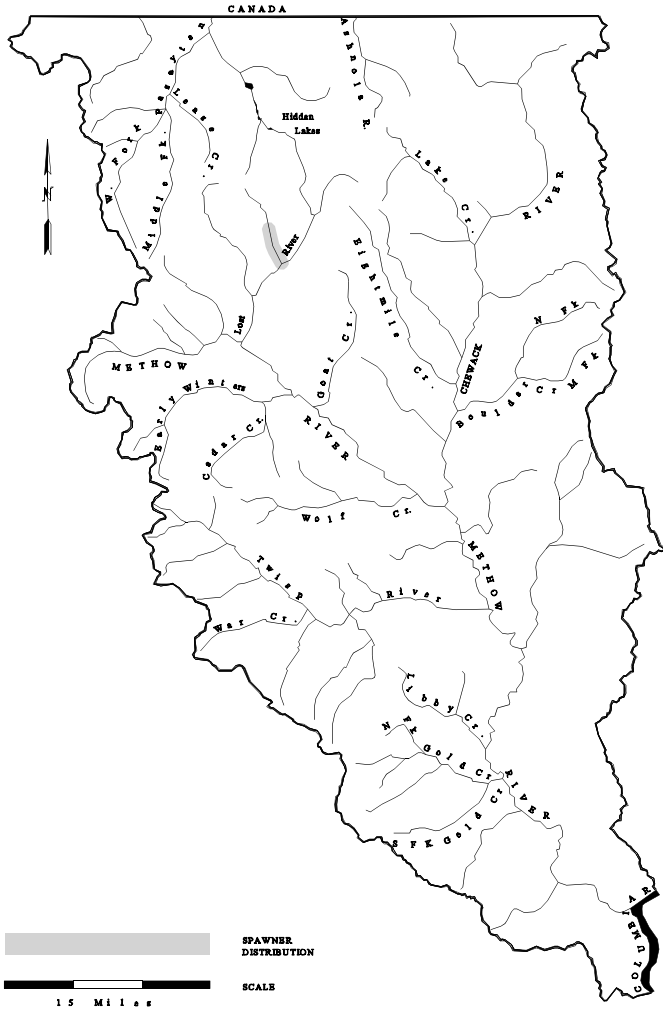
Habitat--This second-order stream is 7.9 miles long and drains an area or 17 square miles. Minimum flow is less than 5 cfs. Spawning is from RM 0.0 to an undetermined point above RM 1.0. The gradient to RM 1.0 is 9.8%, and elevation ranges from 2,950 to at least 3,500 feet.

All of this basin is within the Pasayten Wilderness, and habitat has not been altered by human activity. Low elevation and the southern exposure of the middle to lower channel are warming factors, whereas the short run from high-elevation ice fields and the deeply incised canyon counteract warming. The net result is that fluvial fish are highly vulnerable to climatic warming. The vulnerability of resident fish depends on the elevation of their upstream distribution. Monument Creek is a torrential stream of stairstepping plunge pools. The majority of cover is from boulders and turbulence.

STOCK DEFINITION PROFILE for Monument Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Monument Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	ESCAPE Redds			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94	2			
95	0			
96				
97				

The 1994 survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Gravel and large woody debris are scarce. Riparian vegetation is lacking in the lower basin.

Hydroelectric development of the Columbia River has greatly altered the environment, reducing rearing capacity for and obstructing migration of some fluvial fish.

Harvest Management--Harvest of bull trout/Dolly Varden in Monument Creek is prohibited. Bait is allowed in other fisheries, but angling pressure is almost non-existent because of inordinately difficult access. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

Hatchery--No hatchery-origin salmonids have been introduced into Monument Creek.

Species Interactions--The Lost River up to Monument Creek is too warm for bull trout/Dolly Varden, and rainbow trout predominate. Cold water from Monument Creek gives bull trout/Dolly Varden a thermal advantage, and they are the most abundant salmonid there. Rainbow trout are invading lower Monument Creek, suggesting that temperatures are now marginal for fluvial fish.

METHOW -- COUGAR LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bull trout/Dolly Varden in Cougar Lake are native and considered distinct because they are usually isolated from the population in First Hidden Lake. The stock is composed primarily of the adfluvial life history form, but some resident fish from the Lost River may enter Cougar Lake and spawn with Cougar Lake fish in the outlet. Two-way or even three-way stock mixing may take place when First and Middle Hidden Lakes are connected during extraordinary spring flooding. Spawning is confined to the outlet, but spawn timing is unknown.

STOCK STATUS

Stock status is Unknown. Overnight sampling with a gillnet (50-foot, variable mesh) was conducted in 1972. Data quality is fair.

FACTORS AFFECTING PRODUCTION

Habitat--Cougar Lake is the second lake below Middle Hidden Lake, the source of the Lost River. The elevation is 4,260 feet, and the surface area is 21 acres. The lake is uniformly shallow, with a maximum summer depth of 15 feet. Surface temperature is colder and less variable than in the Hidden Lakes, and the lake probably does not stratify during the summer. The pH in Cougar Lake is neutral versus distinctly basic for the Hidden Lakes. The annual frequency with which First Hidden Lake overflows in spring runoff and spills into Cougar Lake is unknown. In the summer, fall and winter, subsurface flow from Ptarmigan Creek and First Hidden lake emerges from the substrate about a mile above the lake. Bull trout/Dolly Varden do not use the inlet stream for spawning for lack of gravel. Compared to the Hidden Lakes, the water level in Cougar Lake is stable.

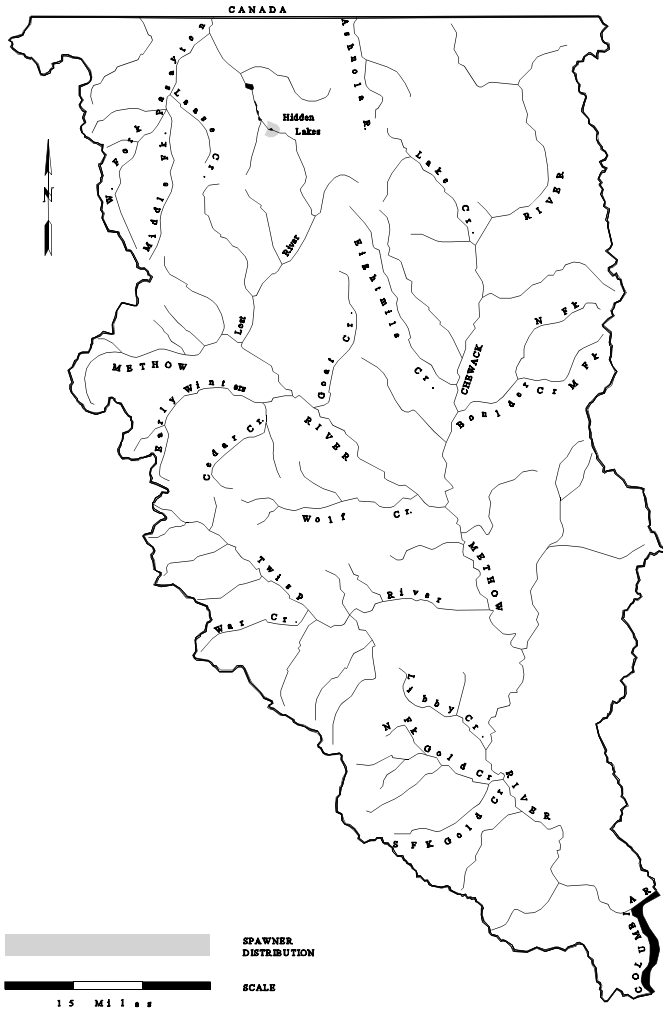
Cougar Lake is in pristine condition today, and its location in the U. S. Forest Service Pasayten Wilderness should guard against human-caused habitat degradation in the future.

Harvest Management--Cougar and the Hidden lakes are popular destination sites for backpack/horseback users, but the 14-mile trek and the short season limit visits. Fishing is light, and bull trout/Dolly Varden catch is low compared to that of rainbow and cutthroat trout.

STOCK DEFINITION PROFILE for Cougar Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Cougar Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr			
72	0.26			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Taking bull trout/Dolly Varden is illegal. Some bait-related hooking mortality and illegal harvest occurs, but the effect is minor.

Hatchery--Rainbow trout may be native to the Lost River basin, but releases of this species date back to the 1930s. Introductions of rainbow and cutthroat trout fry in 1975 have not resulted in negative interactions yet, though climate warming may allow threats from rainbow trout in the future.

Species Interactions--Rainbow trout and bull trout/Dolly Varden co-exist in Cougar Lake, though temperature in the outlet spawning area appears to favor rainbows which predominate in the outlet creek. Perhaps the massive debris dam that clogs the outlet provides a cover dynamic that permits bull trout/Dolly Varden to co-exist with rainbows rather than be excluded. How changing climate might affect these interactions is unclear, however, it is prudent to assume that warming would favor rainbow trout.

METHOW -- FIRST HIDDEN LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Bull trout/Dolly Varden in First Hidden Lake are usually isolated from those Cougar and Middle Hidden lakes, though gene flow with bull trout/Dolly Varden from Cougar and Middle Hidden Lakes may occur following unusually high water levels in First Hidden Lake. The stock is primarily the adfuvial life history form, but some resident fish may reside in lower Ptarmigan Creek and recruit into First Hidden Lake during spring runoff. Spawning may occur in the lake, as the Ptarmigan Creek delta dries well before the spawning begins. It seems unlikely that adfluvial fish move into the stream in high water and remain there until they spawn. Between the creek disappearing into the alluvium above the lake and the barrier falls upstream, bull trout/Dolly Varden are confined to about 0.3 miles. Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown but may be Healthy. Quantitative data are based on sampling with single gillnets (50 foot, variable mesh) fished overnight in 1972, 1977, and 1994. Catch rates seem to reflect fair but stable abundance. Data quality is good.

FACTORS AFFECTING PRODUCTION

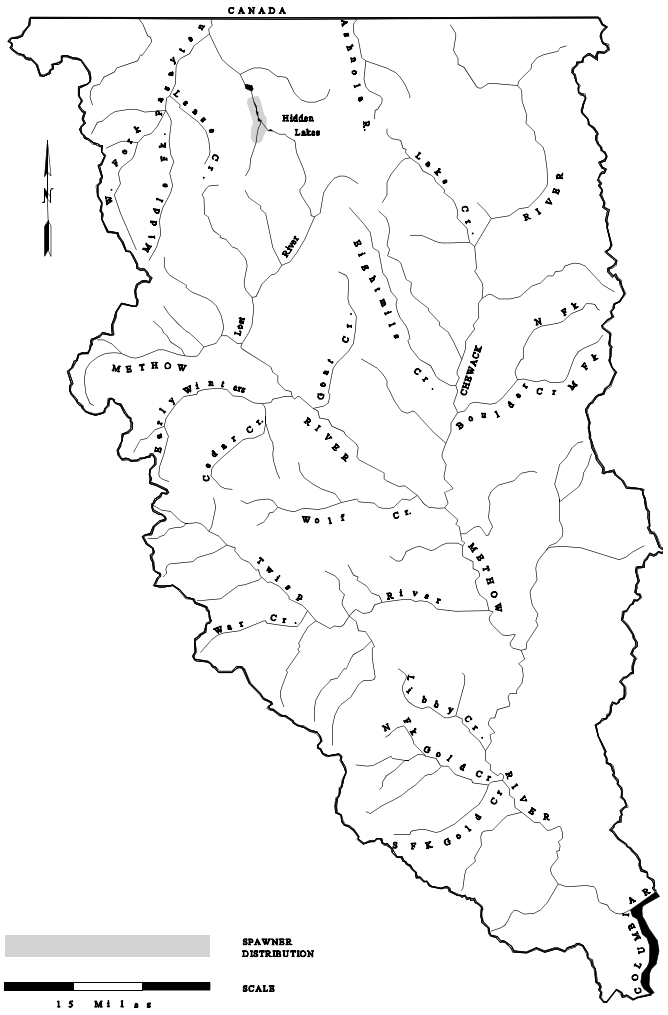
Habitat--First Hidden Lake is the next lake upstream from Cougar Lake but below Middle Hidden Lake, the source of the Lost River. Ptarmigan and Stub Creeks drain into First Hidden Lake. In high water the lake has two equal-sized sections, the southernmost of which usually dries each summer, killing any fish contained in it. The perennial portion is about 19 surface acres in late summer and 4,303 feet in elevation. The annual frequency with which First Hidden Lake overfills and spills into Cougar Lake and receives overflow from Middle Hidden Lake is unknown, but the latter occurs less frequently.

The water is slightly basic (pH 7.5). On September 4, 1972 the high temperature was 12.8° C. The lake temperature is more variable than in Cougar Lake, and First Hidden Lake probably stratifies in the summer. Maximum depth varies within and between seasons. In late summer of 1972, a year of unusually high discharge, maximum depth was measured at 25 feet. The lake's substrate is so porous that lake levels decline up to twenty feet by late summer. This porosity and water movement (incoming and outgoing subsurface flow) combined with gravel oxygenates water in the gravel sufficiently to enable lake spawning.

STOCK DEFINITION PROFILE for First Hidden Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for First Hidden Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Good

Return Years	FW PROD Fish/Hr			
72	0.12			
73				
74				
75				
76				
77	0.78			
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94	0.26			
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

A barrier falls about 0.3 mile above the start of perennial flow in lower Ptarmigan Creek limits bull trout/Dolly Varden production there. This second-order stream is 4.8 miles long. The gradient is 14.5%, and elevation ranges from 4,290 to 4,520 feet.

The Lost River lakes have not been altered by human activities, and their location in the Pasayten Wilderness should protect them from future human-caused habitat degradation.

Harvest Management--Cougar Lake and the Hidden lakes are popular destination sites for backpack/horseback users, but the 14-mile trek and the short season limit visits. Fishing is light, and bull trout/Dolly Varden catch is low compared to that of rainbow and cutthroat trout. Taking bull trout/Dolly Varden is illegal. Some bait-related hooking mortality and illegal harvest occurs, but the effect is minor.

Hatchery--Rainbow trout may be native to the Lost River basin, but multiple stockings of this species date back to the 1930s. Introductions of rainbow and cutthroat trout fry in 1975 have not resulted in negative interactions yet, though climate warming may permit threats from rainbow trout in the future. Brook trout were planted in First and Middle Hidden Lakes in 1972, but there is no evidence of them today.

Species Interaction--Rainbow trout and bull trout/Dolly Varden co-exist in all three lakes but not in Ptarmigan Creek, where bull trout/Dolly Varden live with cutthroat trout in water too cold for rainbow trout. Because of the unusual adfluvial life histories for both species (i.e., lake spawning), bull trout/Dolly Varden and rainbows co-exist rather than rainbow trout excluding bull trout/Dolly Varden as expected in the fluvial environment. Responses of this interaction to changing climate are unclear.

METHOW -- MIDDLE HIDDEN LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Native bull trout/Dolly Varden in Middle Hidden Lake are usually isolated from those First Hidden Lake, consequently Middle Hidden Lake fish are considered geographically distinct stock. Some gene flow with bull trout/Dolly Varden from First Hidden Lake and even Cougar Lake may occur when water levels are high. The stock is adfuvial. Spawning occurs in the lake, as conditions are unsuitable in Gunbarrel Creek, the lake's only tributary. Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown. Quantitative data are based on sampling with single gill nets (50 foot, variable mesh) fished overnight in 1972 and 1977. Catch rates seem to reflect fair but stable abundance. Data quality is fair.

FACTORS AFFECTING PRODUCTION

Habitat--Middle Hidden Lake is the source of the Lost River. Inflow from Gunbarrel Creek sustains the lake. The annual frequency of overfilling and spilling into First Hidden Lake is unknown, but probably happens less often than First Hidden Lake overflows into Cougar Lake, because inflow into First Hidden Lake is much greater than into Middle Hidden Lake.

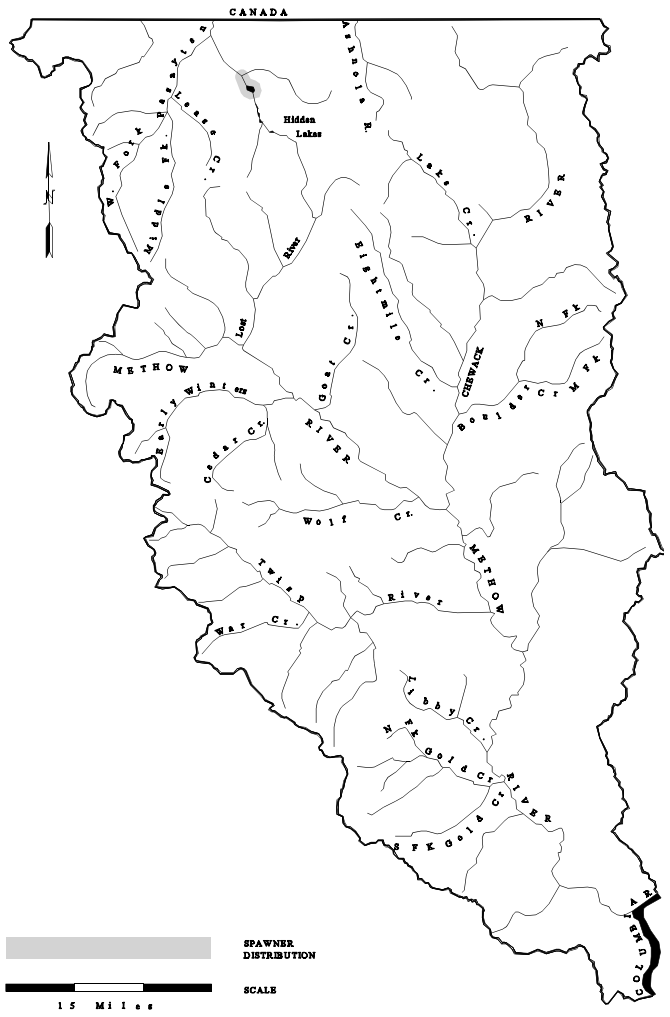
The water in Middle Hidden Lake is slightly basic (pH 7.5). On September 4, 1972 the high temperature was 13° C. The water temperature in the lake is more variable than that in Cougar Lake, and Middle Hidden Lake probably stratifies in the summer. Maximum depth varies within and between seasons. In late summer of 1972, a year of unusually high discharge, maximum depth was at least 30 feet. The lake's substrate is less porous than that in First Hidden Lake, and water level fluctuates much less (six to eight feet in August), improving productivity somewhat, though on September 4, 1972 a Secchi disk was visible at maximum depth. Subsurface inflow or outflow in suitably-sized gravel attracts spawning bull trout/Dolly Varden.

The Lost River lakes have not been altered by human activity, and their isolated location in the Pasayten Wilderness should protect against future human-caused perturbations.

STOCK DEFINITION PROFILE for Middle Hidden Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**DISTINCT?**
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Middle Hidden Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Fair

Return Years	FW PROD Fish/Hr			
72	0.14			
73				
74				
75				
76				
77	0.13			
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Harvest Management--Cougar Lake and the Hidden lakes are popular destination sites for backpacker and horseback users, but the 14-mile trek and the short season limit visits. Fishing is light, and bull trout/Dolly Varden catch is low compared to that of rainbow and cutthroat trout. Taking bull trout/Dolly Varden in Middle Hidden Lake is illegal. Some bait-related hooking mortality and illegal harvest occurs, but the effect is minor.

Hatchery--Rainbow trout may be native to the Lost River basin, but multiple stockings of this species date back to the 1930s. Introductions of rainbow and cutthroat trout (1975) fry have not resulted in negative interactions with bull trout/ Dolly Varden yet, though climate warming may provide the opportunity for threats from rainbow trout in the future. Brook trout were released into First and Middle Hidden Lakes in 1972, but there is no evidence of them today.

Species Interactions--Rainbow trout and bull trout/Dolly Varden in Middle Hidden Lake both exhibit an unusual adfluvial life history feature (lake spawning). As a result they co-exist in Middle Hidden Lake rather than excluding one another as expected in the fluvial environment. The response of this interaction to changing climate is unclear.

METHOW -- WEST FORK METHOW BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

This fluvial stock is both native and distinct, isolated thermally and geographically from other bull trout/Dolly Varden populations. Spawning occurs in the mainstem from Trout Creek (a few spawn in lower Trout Creek) to the falls from early September through mid-October.

Size-at-maturity of females confirms that the population consists of the fluvial life history form. A barrier falls limits the potential distribution of the population into the coldest water, where the resident form would likely occur.

STOCK STATUS

Stock status is Unknown but may be Healthy. A standing crop estimate was made at RM 9.7 in 1989. An initial redd count was made in 1995, and the 27 redds amounted to the largest count in the Methow basin. Data quality is excellent but limited.

FACTORS AFFECTING PRODUCTION

Habitat--This third-order river is 13.8 miles long and drains an area of 83 square miles. Minimum flow at RM 1.8 is 39 cfs. Spawning occurs between RM 4.9 and RM 10.1, in a gradient of 3.4%, and elevations ranging from 2,950 to 3,880 feet. All but a small portion of the lower river is within the Okanogan National Forest.

The habitat is isolated and in pristine condition. Tributary streams drain north-facing slopes and five glaciers, so water temperature is extraordinarily cold. Riffles and boulders predominate. Spawning gravel and large woody debris are scarce.

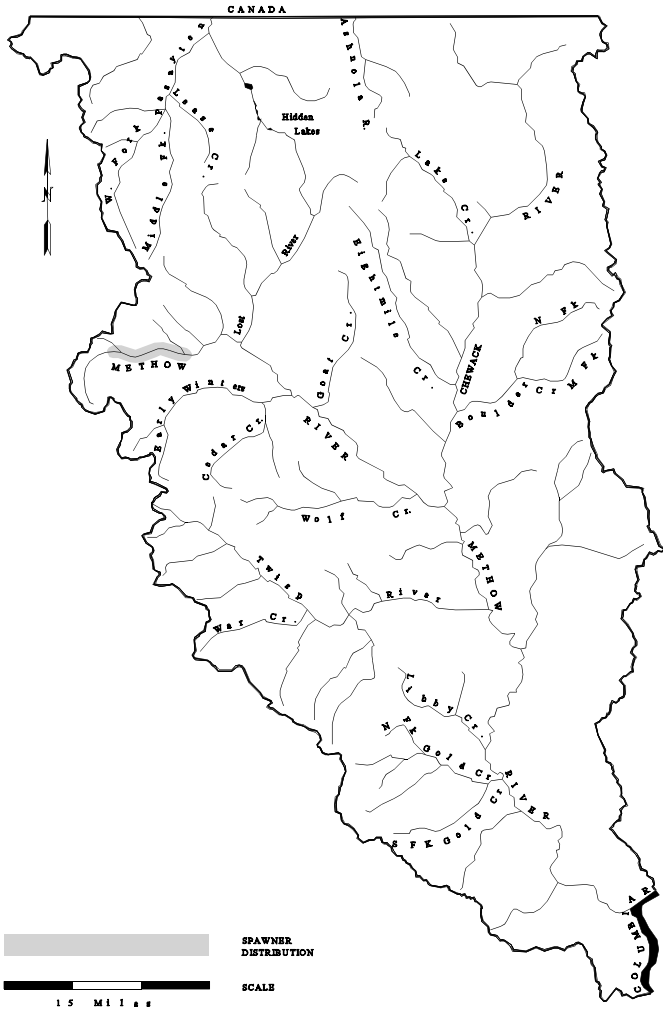
Impoundment of the Columbia River has lowered its productivity for rearing fluvial bull trout/Dolly Varden, and dams kill and obstruct some migrants.

Harvest Management--West Fork Methow bull trout/Dolly Varden are protected from harvest. Angling effort for other species is very low because of the isolation and the brushy, torrential nature of the stream. Bait-related hooking mortality, illegal harvest, and poaching of fluvial spawners is insignificant. Hooking mortality and illegal harvest of bull trout/Dolly Varden are expected to decline downriver in the Methow and Columbia rivers as a result of the closure of the recreational steelhead fishery. The closure is associated with the listing of upper Columbia steelhead as threatened under the Endangered Species Act in August, 1997.

STOCK DEFINITION PROFILE for West Fork Methow Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning									■	■			No

BIOLOGICAL CHARACTERISTICS

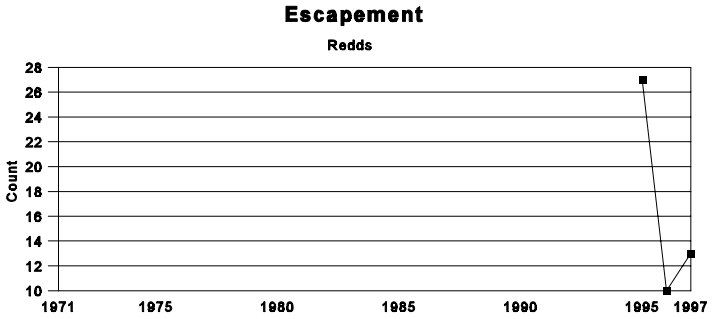
DISTINCT? - Unknown

STOCK STATUS PROFILE for West Fork Methow Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> Excellent

Return Years	ESCAPE Redds	FW PROD No./100m^2		
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89		9		
90				
91				
92				
93				
94				
95	27			
96	10			
97	13			



The 1997 redd survey was incomplete.

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Hatchery--All hatchery-origin rainbow trout and steelhead releases were made well below the breeding and initial rearing zone of bull trout/Dolly Varden and have had no discernable effect on them. Occasionally cutthroat trout have been released into the bull trout/Dolly Varden breeding zone and above the falls, where they abound, but this program has had no negative consequences because these species are ecologically compatible.

Species Interaction--Rainbow trout and bull trout/Dolly Varden interface at Trout Creek. The bull trout/Dolly Varden zone extends from Trout Creek to the barrier falls, a distance of 5.1 miles, a great length compared to other streams, making it a stronghold for bull trout/Dolly Varden in the Methow basin. Only the stock in Early Winters Creek above the falls is more secure.

OVERVIEW -- UPPER COLUMBIA
BULL TROUT/DOLLY VARDEN STOCKS

FRANKLIN D. ROOSEVELT LAKE
PEND OREILLE
SOUTH SALMO
GRANITE CREEK

STOCK DEFINITION AND ORIGIN

Limited information exists for bull trout/Dolly Varden within Washington in the Upper Columbia River system. Based on the information available, stocks have been identified as occurring in the Franklin D. Roosevelt Lake, Pend Oreille, South Salmo and Granite Creek drainages. Bull trout/Dolly Varden have been observed in Cedar Creek (north of Cedar Lake, Stevens Co.). While bull trout/Dolly Varden have been observed in the Canadian portion of Cedar Creek, none have been observed in Washington. Recent sampling conducted by the U.S. Forest Service in the East Fork Cedar Creek found only brook trout. Habitat in the Washington portion of Cedar Creek is not suitable for bull trout/Dolly Varden due to extensive agricultural and logging activities. Based on the available information a Cedar Creek stock has not been designated in Washington.

The bull trout/Dolly Varden in the Upper Columbia River system are native. No hatchery introduction of bull trout/Dolly Varden has occurred.

STOCK STATUS

Currently no trend data exist for the bull trout/Dolly Varden stock in the upper Columbia River system in Washington. Until trend data are obtained for these stocks they are assigned a status designation of Unknown.

UPPER COLUMBIA -- FRANKLIN D. ROOSEVELT LAKE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Franklin D. Roosevelt (FDR) Lake was formed by construction of the Grande Coulee Dam on the Columbia River in the early 1940s. The upper reaches of FDR Lake lie just south of Onion Creek, a small tributary near Northport, Washington. From there to the Canadian border the Columbia River is free-flowing. FDR Lake is 83,000 surface acres at normal pool elevation.

Two bull trout/Dolly Varden were observed in FDR Lake near the mouth of Onion Creek in 1991. One bull trout/Dolly Varden was captured and released near the mouth of Boulder Creek in the Kettle River drainage in 1991. Other bull trout/Dolly Varden have been captured in the lake near Hawk, Hunters and Sherman creeks. The largest of these fish was 280 mm long, and the smallest was 152 mm long. The scattered locations of bull trout/Dolly Varden sightings suggest that these fish may be straying from Canadian waters.

No spawning activity has been observed in any tributaries of the lake.

STOCK STATUS

The status of FDR Lake bull trout/Dolly Varden is Unknown. Trend information is not available to assess status.

FACTORS AFFECTING PRODUCTION

Habitat--Most of the tributaries of FDR Lake lie in private or U.S. Forest Service land. Habitat is either not suitable for spawning or is inaccessible to bull trout/Dolly Varden. All tributaries have been degraded by agricultural or logging activities with the result that sediment levels are high, water temperature is too high for bull trout/Dolly Varden spawning, and habitat complexity has been lost. Some tributaries are not accessible because waterfalls prevent upstream migration.

Harvest Management--FDR Lake has been closed to the taking of bull trout/Dolly Varden since 1992. FDR Lake is open year-round for other gamefish.

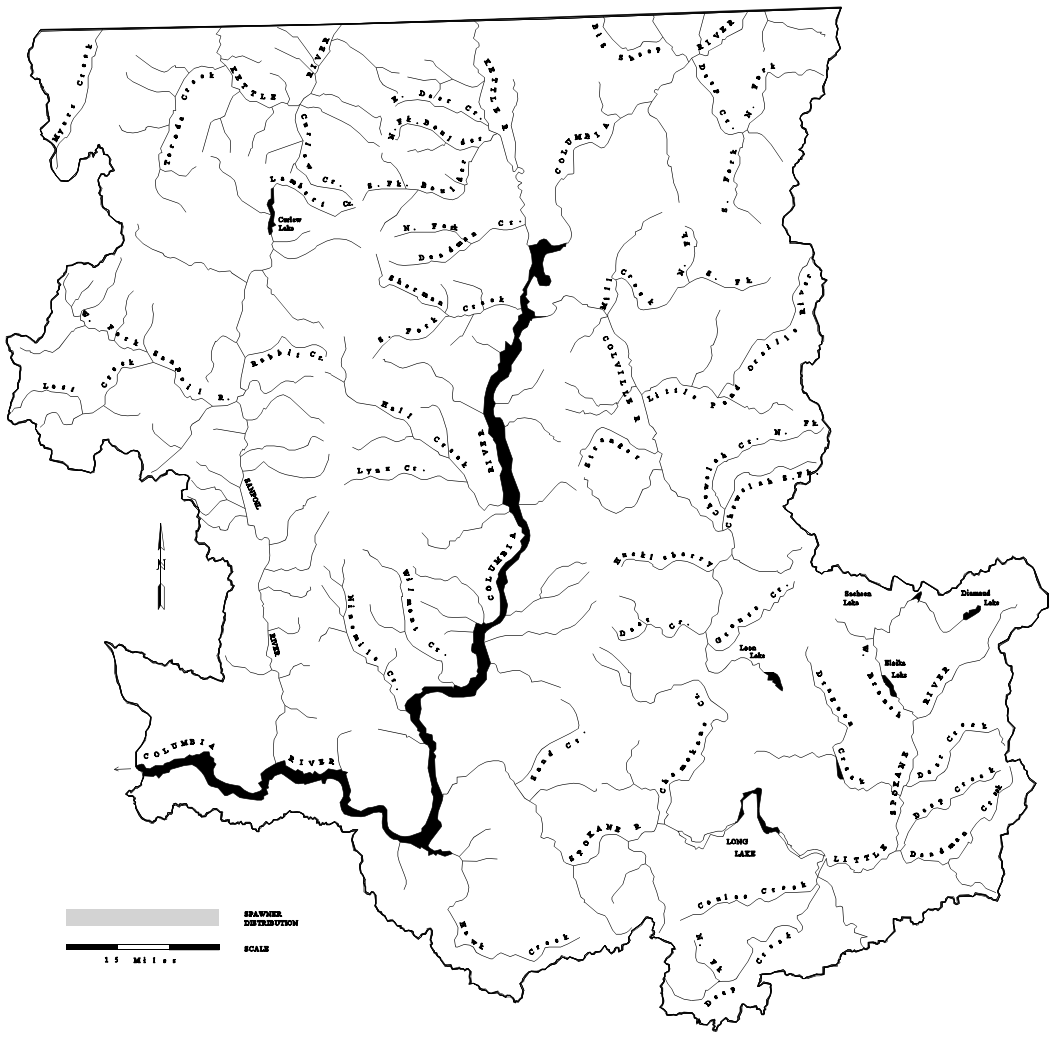
Hatchery--Brook trout, rainbow trout, walleye, burbot, smallmouth bass, lake whitefish, yellow perch and common carp have all been introduced into the system and are well established in FDR Lake. Interactions with bull trout/Dolly Varden have not been examined.

STOCK DEFINITION PROFILE for FDR Lake Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Unknown**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for FDR Lake Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
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85				
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95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

UPPER COLUMBIA -- PEND OREILLE BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The Pend Oreille River originates at the outflow of Lake Pend Oreille in Idaho. It flows into Washington just east of the town of Newport. The river then flows north and enters Canada approximately fourteen miles north of Metaline Falls and ultimately enters the Columbia River at Waneta, British Columbia. Pend Oreille bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Bull trout/Dolly Varden have been identified in or near several small tributaries in Washington including Slate, Sullivan, Mill, LeClerc, Cedar and Winchester creeks. No more than one to three fish have been seen in each stream.

Little is known about the genetics or life history of these fish. Brook trout were sampled for genetic analysis in 1995. No evidence of ongoing hybridization with bull trout/Dolly Varden was found. We believe that hybridization between introduced brook trout and bull trout/Dolly Varden occurred earlier when bull trout/Dolly Varden were more numerous. Hybridization is now considered unlikely because bull trout/Dolly Varden numbers are very low.

No spawning bull trout/Dolly Varden have been documented, and only about one dozen fish have been seen. These fish are known to be native since no bull trout/Dolly Varden have been stocked in Washington or Idaho.

STOCK STATUS

Stock status is Unknown. Although spawning escapement or relative abundance information is not available, the extremely small numbers of bull trout detected in the system are cause for concern.

FACTORS AFFECTING PRODUCTION

Habitat--All of the Pend Oreille tributaries lie either on the Colville National Forest or on private, intensively-managed timber lands. Five hydroelectric dams, all lacking fish passage facilities, are located on the Pend Oreille River. Habitat degradation as well as the hydroelectric dams and past hybridization with brook trout have combined to all but eliminate bull trout/Dolly Varden in this drainage.

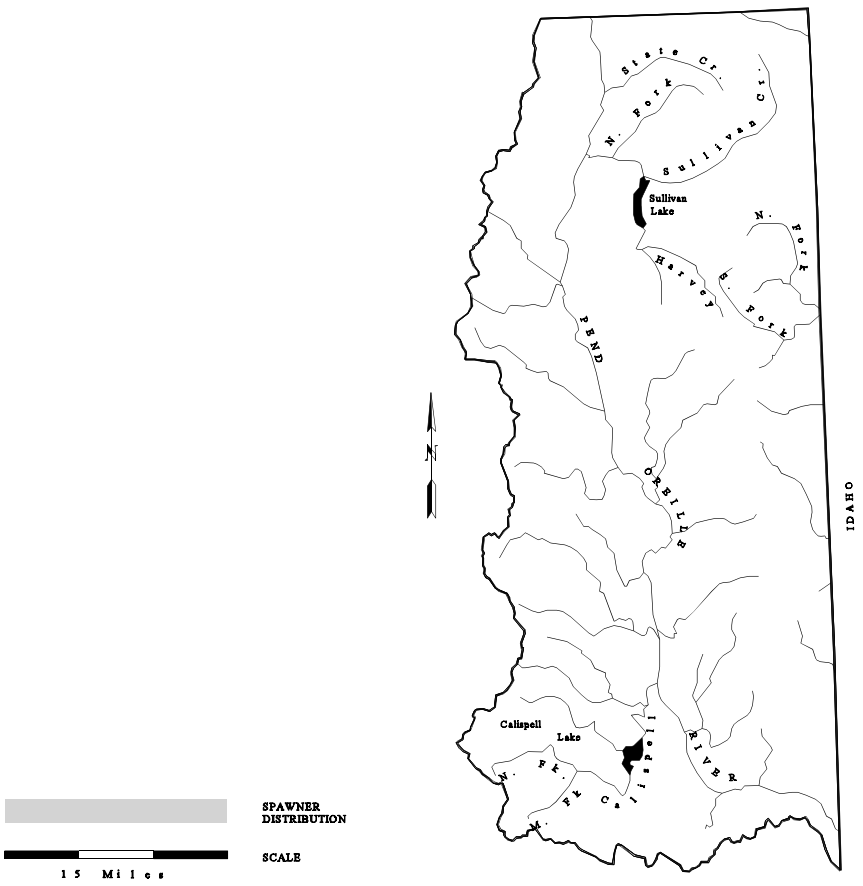
Harvest Management--Before 1992 bull trout/Dolly Varden angling was controlled by standard statewide seasons and limits for trout, except in the mainstem Pend Oreille River where the fishing was open year-round. Since 1992 fishing for bull trout/Dolly Varden in the Pend Oreille drainage has been closed.

STOCK DEFINITION PROFILE for Pend Oreille Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**

Spawner distribution is distinct for this stock, but specific spawning locations are unknown.



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Pend Oreille Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
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85				
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97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

Hatchery--Introduced brook trout populations were established by the early to mid-1940s. However, an brook trout broodstock station was in operation in the 1920s in Stevens County. The station was operated by the federal government and then, presumably, by the counties in NE Washington until 1933. Stocking brook trout in waters connected to the Pend Oreille River was stopped in 1994. Rainbow and cutthroat trout stocking in lakes connected to the Pend Oreille system continues as an integral part of the resident trout fishery program. Interactions between these hatchery-origin trout and bull trout/Dolly Varden/Dolly Varden have not been examined.

UPPER COLUMBIA -- SOUTH SALMO BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

The South Salmo River originates in the northeast corner of Pend Oreille County, Washington in the Salmo-Priest Wilderness. It flows northwest for about five miles where it enters British Columbia. It is a tributary of the Salmo River in Canada, which flows into the Pend Oreille River in Canada. South Salmo bull trout/Dolly Varden have been identified as a distinct stock based on their geographic distribution. Bull trout/Dolly Varden were captured in the South Salmo River within the Salmo-Priest Wilderness in the mid-1970s by U.S. Forest Service personnel. Electrofishing efforts by WDFW and the Forest Service in 1994 found no bull trout/Dolly Varden even though sampling was done in the same stream areas as in the 1970s. Verbal communication with Canadian biologists indicates that bull trout/Dolly Varden inhabit the mainstem Salmo River in British Columbia.

Spawn timing is unknown.

STOCK STATUS

Stock status is Unknown. Spawning escapement or other relative abundance information is not available.

FACTORS AFFECTING PRODUCTION

Habitat--The South Salmo in Washington lies entirely within the Salmo-Priest Wilderness. Habitat is pristine, and water temperatures are cold enough for bull trout/Dolly Varden spawning.

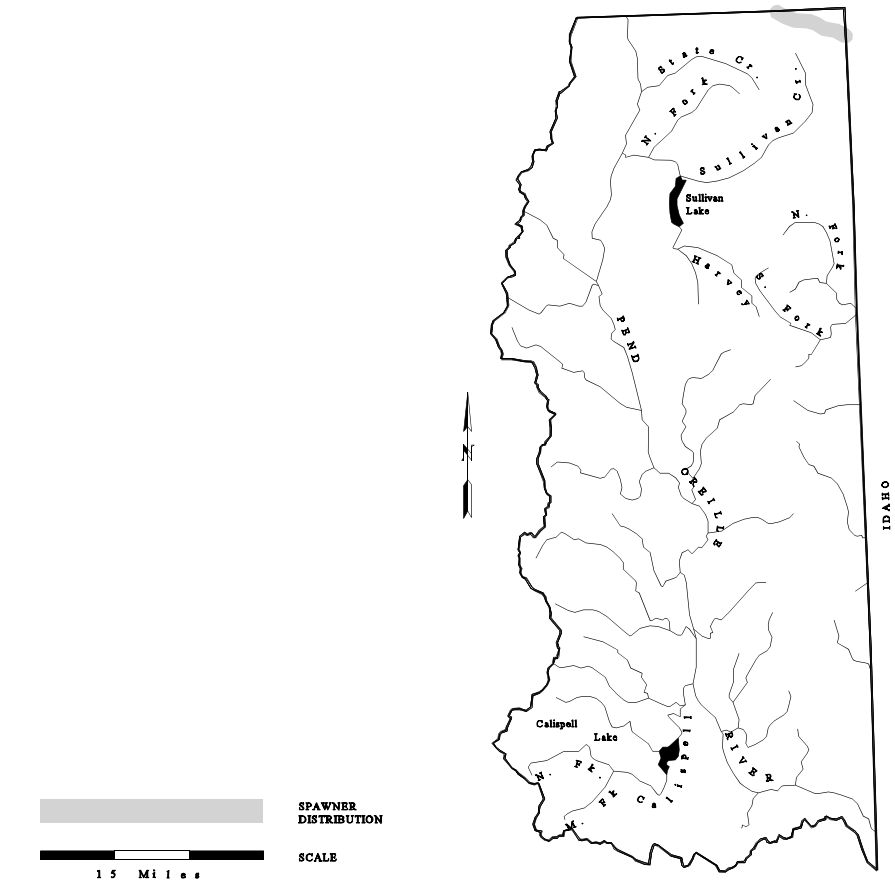
Harvest Management--Prior to 1992 bull trout/Dolly Varden were considered a part of the trout catch limit in Washington. Since 1992 the South Salmo has been closed to fishing for bull trout/Dolly Varden.

Hatchery--There have been no releases of hatchery-origin trout or other char species in the South Salmo River.

STOCK DEFINITION PROFILE for South Salmo Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawn timing is unknown for this stock.												Unknown

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for South Salmo Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
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84				
85				
86				
87				
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93				
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96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria

UPPER COLUMBIA -- GRANITE CREEK BULL TROUT/DOLLY VARDEN

STOCK DEFINITION AND ORIGIN

Granite Creek is a tributary of Priest Lake, Idaho. Approximately 10 miles of the creek are located in Washington State. Spawning bull trout/Dolly Varden were observed by U. S. Forest Service habitat survey contractors in the early 1990s. Spawning also occurs downstream of the Idaho portion of the stream. Spawning occurs from early October through November.

This stock is an adfluvial stock which enters Granite Creek from Priest Lake. During recent electrofishing efforts, resident bull trout/Dolly Varden were observed in the Idaho portion of the stream. This indicates there may be both adfluvial and resident life history components.

STOCK STATUS

Stock status is Unknown but may be Depressed due to low numbers of observed fish. Additional information is needed to determine stock status. Spawning escapement or other relative abundance information is not available.

FACTORS AFFECTING PRODUCTION

Habitat--Granite Creek in Washington is fairly pristine in spite of its proximity to a major Forest Service road. It is a low-productivity stream and may support only spawning and early rearing of bull trout/Dolly Varden fry.

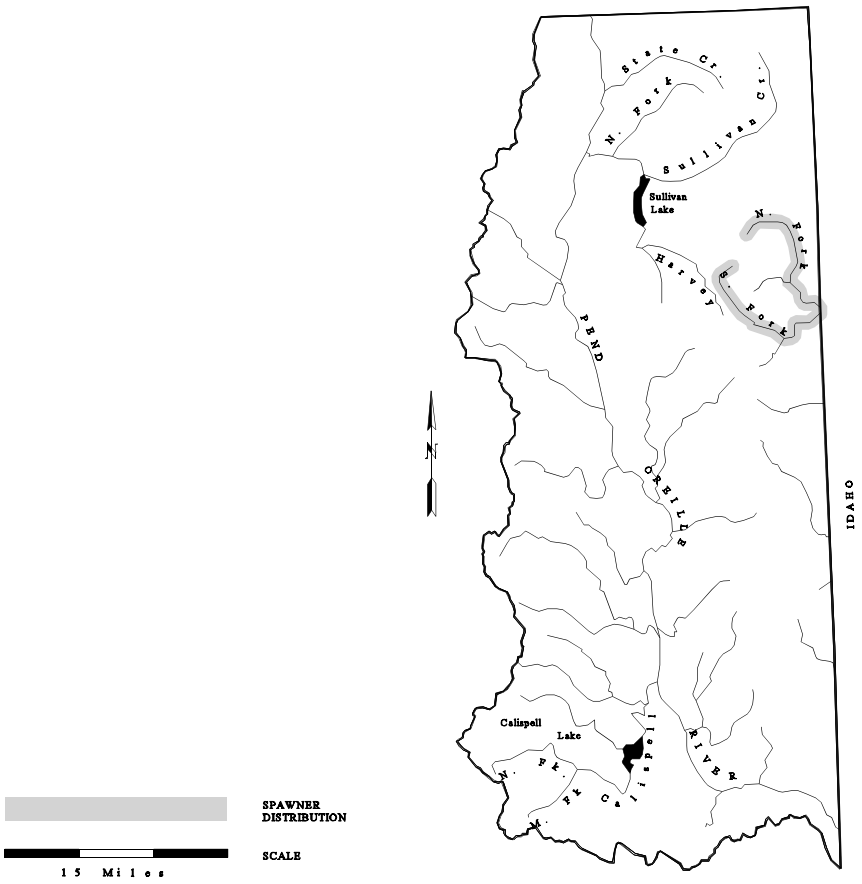
Harvest Management--Granite Creek in Washington has been closed to fishing since 1984. The Idaho portion of the stream was closed to fishing in 1978. In 1992 the creek was reopened to fishing but remained closed to harvesting bull trout/Dolly Varden.

Hatchery--Brook trout were probably introduced in the early 1920s, but none have been stocked in recent decades. The brook trout population is now self-sustaining, and is now the dominant species in Granite Creek. Competition, rather than hybridization, with brook trout is thought to be the major threat to bull trout/Dolly Varden in this stream. The adfluvial bull trout/Dolly Varden may be too large to spawn with brook trout which are about eight inches long in Granite Creek.

STOCK DEFINITION PROFILE for Granite Creek Bull Trout/Dolly Varden

SPAWNER DISTRIBUTION

DISTINCT? - **Yes**



TIMING	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	DISTINCT?
Spawning										■	■	■	No

BIOLOGICAL CHARACTERISTICS

DISTINCT? - Unknown

STOCK STATUS PROFILE for Granite Creek Bull Trout/Dolly Varden

STOCK ASSESSMENT

DATA QUALITY -----> No Data

Return Years	NO DATA			
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				

AVERAGE RUNSIZE DISTRIBUTION

Data not available.

STOCK SUMMARY

Stock Origin
Native

Production Type
Wild

Stock Distinction
Distribution

Stock Status
Unknown

Screening Criteria